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SEED WHEAT.

VARIETIES FOR DISTRIBUTION AMONG FARMERS.

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Owing to the disastrous drought of 1914 and the consequent failure of the crops, considerable difficulty will be experienced in securing for the 1916 seeding wheat true to name and free from an admixture of foreign varieties. The abnormal scarcity of seed last year resulted in large areas being sown with seed of inferior quality, which in normal years would have either been gristed or used for the feeding of stock.

In view of this, farmers will be interested to know that graded seed of some sixteen different varieties is available for distribution by the Department of Agriculture.

Importance of Good Seed.

The importance of sowing and producing good seed is not sufficiently appreciated by the average wheat-grower. On the majority of farms the most that is done is to reserve the best grown and cleanest part of the crop for next season's seed. This is a step in the right direction, but is not sufficient to enable the grower to obtain the maximum yields the soil and climate will permit.

Value of Grading.—In a number of cases the process of preparing the seed is carried a stage further, and the whole of the seed is passed through a grader, with the object of eliminating small, shrunken, as well as immature seed. Though it is generally admitted that such treatment is advantageous, a considerable proportion of the wheat-growers fail to grade their seed each year.

A typical illustration of the value of grading may be seen from the results obtained at the Wyuna State Farm. Four plots were sown side by side under identical treatment as regards manuring and cultivation. One plot was sown with normal Federation seed just as it came from the

harvester. The remaining three plots were sown with firsts, seconds, and thirds seeds obtained from this normal seed by a centrifugal barrel grader. The results were as follow:—

Grade I., 28 bushels 6 lbs.
Grade II., 27 bushels 33 lbs.
Normal, 25 bushels 27 lbs.
Grade III., 23 bushels 50 lbs.

Thus for the trifling cost of, say, 6d. per bushel an increase of 2½ bushels per acre, worth at 4s. per bushel 10s. per acre, was obtained.

While possibly the majority of farmers choose the best grown and cleanest of their crop for seed, and a large number regularly submit this well-grown seed to a process of grading, it is safe to say that only a very small percentage of wheat-growers carry the process a stage further and subject the growing seed crop to deliberate, systematic, and continuous selection, with the object of increasing the prolificacy of the variety from year to year.

Seed "running out."—Little wonder then that we hear farmers complaining that their seed is "running out," and seek a remedy in a change of seed. Such a change of seed may or may not be beneficial. If the seed is secured from a farmer equally careless in the treatment of the crop no material improvement can possibly result. If, on the other hand, the seed is secured from a source where grading and systematic selection go hand-in-hand, such a change will be accompanied by immediate and satisfactory results; but unless pains are taken to maintain and improve the prolificacy of the seed the benefit arising from the change will only be temporary.

Long experience and careful experiment have demonstrated that the best results are obtained by developing locally-grown seed rather than relying periodically on changes of seed from localities differing considerably in soil and climate.

There is no reason why seed should degenerate, even though it be sown year after year on the same farm. Indeed, by the application of systematic selection, the quality and prolificacy of the seed may not only be maintained, but increased. It is curious to note that whilst farmers are very keen on improving their stock by careful selection, they do not appear to give much thought to the possibilities of improvement of their crops by somewhat analogous methods of selection. Certainly the improvement is slow, as with stock, but it is none the less sure.

Selection of Onion Seed and Beet Seed.—Though the wheat-grower may not be aware of the improvement effected by systematic selection of the wheat crop, the same cannot be said of the onion-grower and beet-grower. For many years past it has been a regular practice in raising sugar beets to sow seed obtained by rigorous selection from the very best plants. The raising of selected beet seed is now a most elaborate process, and it is owing principally to the increase in the prolificacy and the percentage of sugar of the beet that the industry has been able to compete with cane sugar grown by black labour in the tropics. Selection has improved the shape of the roots, increased the yield per acre, and raised the percentage of sugar in the beet.

With the onion crop rigorous selection is applied. The demand for the highest class of onion seed in this State is such that a number of

expert growers make a speciality of the business. One prominent grower of onion seed in the Beeac district regularly disposes of his whole crop of seed at just double the rates for ordinary seed.

View of Bulk Area of Dart's Imperial Seed Wheat, Rutherglen Experiment Farm.

View of Bulk Area of Penny Seed Wheat, Rutherglen Experiment Farm.

With such prices both the grower of selected onion seed and the farmer are satisfied; the former because he gets a price commensurate with his efforts and the labour he puts into the work, and the latter

because experience has taught him that the selected seed will return an increased tonnage over the unselected seed.

Selection applied to the Wheat Crop.

If such results apply to root crops, why not to wheat? As a matter of fact, similar improvement may be obtained with cereals. As a root crop, however, is generally of far higher value than a cereal crop, and as the rental for onion land is invariably much higher than for wheat land, the incentive and the necessity for systematic production of prolific types is greater in the case of the onion-grower than with the wheat-grower. But even with the wheat-grower, costs of production are rapidly rising, and necessity, sooner or later, will compel him to increase the net profits per acre.

One of the surest and unfailing aids will be the bestowal of adequate care on the preparation and selection of the seed. His fourfold task in this direction will be—

(1) To find out the varieties of wheat best suited to the local conditions. This can be done by experimentation.
(2) Grow these varieties on the cleanest and best worked fallows.
(3) Grade the seed each year with a suitable grader, and sow only the best grade of seed.
(4) Adopt a definite policy of systematic selection for improving the prolificacy of the chosen varieties.

An important and necessary task for every progressive farmer is to make himself familiar with the leading types of wheat grown in the State. Soil conditions fluctuate so widely in different parts of the State, and even on parts of the same farm, that it is not possible to indicate, except in a general way, the varieties that would be suitable to any specific locality. Moreover, new varieties are continually coming into cultivation; hence each farmer should be an experimentalist, and carry out tests on a small scale with the leading wheat varieties and any new types that come on the market, with the object of determining in a practical manner the varieties best suited to his conditions. It is not uncommon to find the difference in yield between two varieties of wheat, grown on the same farm under identical conditions, is sufficient to pay the rent and interest on the land on which the crop is grown.

The necessity for grading the seed has already been alluded to. There are still a number of farmers who believe that small shrivelled grain is as good for seed purposes as full plump grain. The result of the following test may assist in undermining this belief. Last season firsts and thirds Federation seed from a centrifugal barrel grader were sown alongside one another under identical conditions at the Rutherglen Experiment Farm in plots 30 chains long and one chain wide. Though sown late in June, the yield from the first grade seed was 26¼ bushels per acre, while the third grade seed yielded only 20¾ bushels. The expenses of production were the same in both cases, yet the prime grain gave an increase of 5½ bushels per acre.

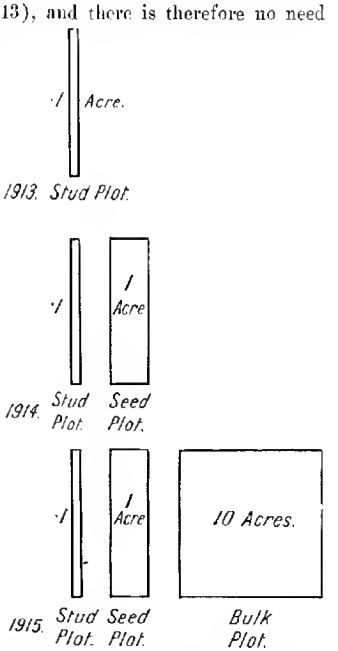
Some Results of Selection.—So far as raising the prolificacy of seed by systematic selection is concerned, the evidence obtained at the Experiment Farms is convincing. Thus, at Longerenong, selected Federation seed has given increases of 12 per cent. to 25 per cent. in yield over

ordinary Federation seed. In 1915, the selected Federation seed gave a yield of 52 bushels per acre, as compared with 45 bushels for ordinary Federation seed sown alongside. At Rutherglen a block of 4½ acres of selected Federation seed gave 204 bushels of grain, a yield of over 45 bushels per acre. No block of ordinary Federation gave over 36 bushels. The following are the yields of selected and ordinary prime Federation seed sown alongside one another for the past four years at Longerenong Agricultural College:—

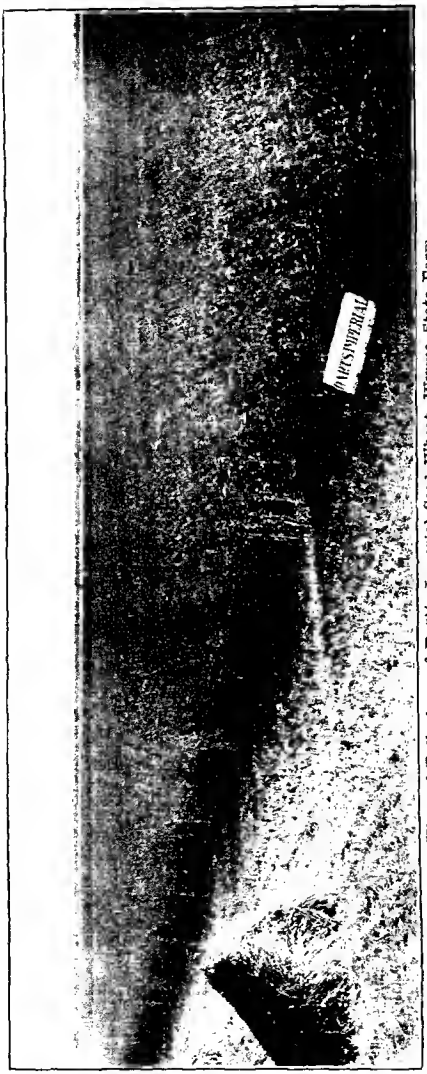
	Selected Federation. Bushels, per acre.	Unselected Federation. Bushels, per acre.	Increase in Yield through Selection. Bushels, per acre.
1912 ..	43.25 ..	34.5 ..	8.75
1913 ..	36.39 ..	24.66 ..	11.53
1914 ..	9.77 ..	5.03 ..	4.72
1915 ..	52.16 ..	46.5 ..	5.66

A Simple Method of Selection.—The methods of improving wheat by selection have already been dealt with in detail in former issues of the *Journal* (March and April, 1913), and there is therefore no need to refer to the methods in detail. A brief description of one method applied on the State farms may be of interest. The basis of the method is that the selection must be continuous and uninterrupted, and at the same time require the minimum of time and labour. The method is known technically as mass selection, and to apply it three series of plots are provided for each variety of wheat, and each year the produce of one series of plots is sown on the plots of the succeeding series.

Thus, for Federation wheat three plots are provided, namely, "stud," "seed," and "bulk" plots, respectively 1-10th, 1, and 10 acres in area. To provide seed for the stud plot about 12 to 15 lbs. of the largest and best heads of the best developed plants in a field are hand-picked and threshed. The seed is carefully graded with hand sieves, and the produce sown at seed time in a plot one drill-width wide in the "stud" plot. The following harvest the procedure is repeated, and the process of selection of the best



Diagrammatic Scheme for Improvement of Wheat at Experiment Farms by Selection.



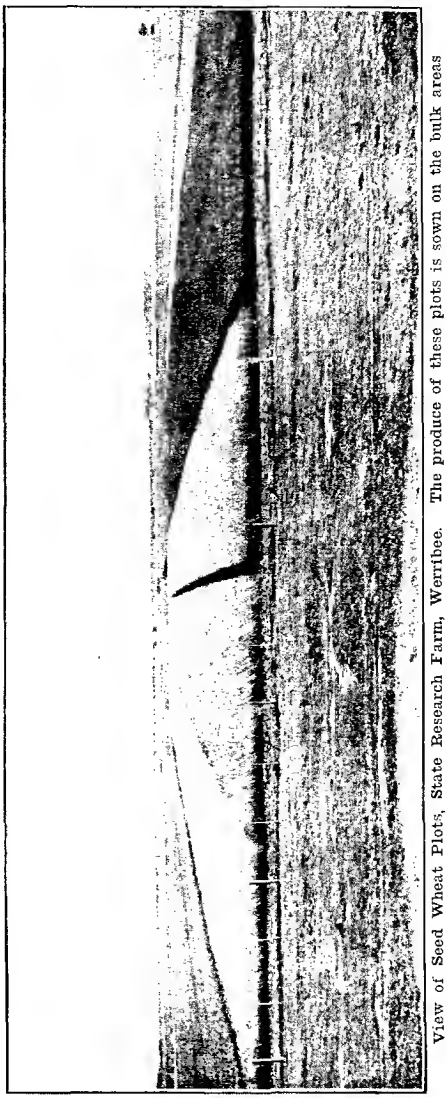
View of Bulk Area of Dart's Imperial Seed Wheat, Wyuna State Farm.

heads being made from the "stud" plot. The selected heads are again sown the following year in the "stud" plot, whilst the rest of the "stud" plot is stripped and the seed sown on the "seed" plot, 1 acre in area, the following year. The third year the process of selection will be complete. As before, selected heads are again taken from the *élite* plants of the "stud" plot for a corresponding plot of the following season. The rest of the "stud" plot is harvested and sown on the 1-acre "seed" plot, whilst the produce of the "seed" plot is sown on the bulk plot of 10 acres to insure the seed for the whole farm for the following year. In this way there is a regular rejuvenation of seed each year, and the full area is ultimately sown with seed which sprung from the best selected plants each year. The ultimate effect of such selection will become clearly apparent, and increased yields may confidently be anticipated. What the increase will be depends on the per-

sonality of the individual performing the work of selection.

The scheme rests on the principle that the best and most prolific types of plants are annually selected as the progenitors of the strain. All the plants actually selected will not, of course, be superior. Some that are included may have been accidentally favoured in the struggle for existence by having more room to develop or a greater supply of plant food to develop than others. But with careful attention on the part of the operator the greater number of plants chosen will prove to be inherently superior, and not merely the expression of a favorable environment.

It is not claimed that this is the best method of improving the variety, but it is a method within the reach of every farmer. It has been practised extensively during the past four years, and has resulted in a material improvement in yield. Moreover, it does not involve much added work.



View of Seed Wheat Plots, State Research Farm, Werribee. The produce of these plots is sown on the bulk areas for distribution as seed.

Wheat Varieties.

Three years ago a series of co-ordinated tests were commenced on the Rutherglen, Werribee, and Wyuna State Farms and the Longerenong Agricultural College. Every available variety of wheat was tested in field plots, with the object of determining the varieties most suited to local conditions. At the same time a commencement was made to raise pure bred seed, true to type, and free from any admixture of foreign varieties, of twenty of the most prolific types that were in general cultivation. Moreover, an effort was made to raise the standard of each variety by subjecting it each year to a rigorous and continuous selection by methods to be presently described.

View of "Stud Selection Plots," Rutherglen Experiment Farm. The produce of these plots is sown on the "Seed Plots," which in turn furnish material for the bulk areas. The prolificacy of each variety is maintained by selecting year by year the best plants appearing in these plots. (Vide diagram, page 69.)

As a result, the Department is now able to distribute a considerable quantity of each of these varieties among farmers, which will furnish each farmer with material from which he can ultimately raise sufficient seed to sow his whole farm.

For the purpose of convenience, the varieties that are being distributed may be classified as follows:—

Early Wheats.—College Eclipse, Comeback, Gluyas, King's Early.

Mid-season and Late Wheats.—Bayah, Commonwealth, Currawa, Dart's Imperial, Federation, Major, Marshall's No. 3, Penny, Yandilla King.

Hay Wheats.—Ungenot, Warden, Zealand Blue.

The following varieties were also tested, but the yields have not been consistently high enough to justify further trials:—Bunyip, Thew, Genoa, Viking, Firbank.

Notes on Varieties.

The following notes on these varieties may prove of use:—

COLLEGE ECLIPSE.—This variety was evolved at Roseworthy from Carmichael's Eclipse—a variety very popular in the northern districts of South Australia. It does not mature as quickly as Gluyas or King's Early, but is a good growing variety of fair stooling capacity, and fairly resistant to fungus diseases. The ear is dark-brown in colour, almost beardless, and holds the grain well. Though somewhat unattractive in appearance, it has given good returns in departmental tests, and will probably prove a good wheat to grow in the drier districts.

COMEBACK.—This is an early variety, of fair stooling capacity, moderately tall, with clean, hollow straw, and makes a very nice sample of hay. The ears are creamy-yellow, beardless and smooth, of moderate length, fairly compact, but with a long tapering tip. The grain is small, somewhat shotty in character, with hard semi-translucent endosperm. The grain is of high milling quality, and is eagerly sought by millers, making a good percentage of high quality flour very suitable for blending purposes. It has been sold on the Sydney and Adelaide markets at various times at 3d. to 6d. per bushel above ordinary f.a.q. wheats. The Victorian Mill-owners' Association agreed to purchase Comeback wheat at 3d. above ordinary market rates. It has the reputation of being a shy yielder, and on this account is not popular with Victorian farmers, though in some of the drier districts it has done remarkably well.

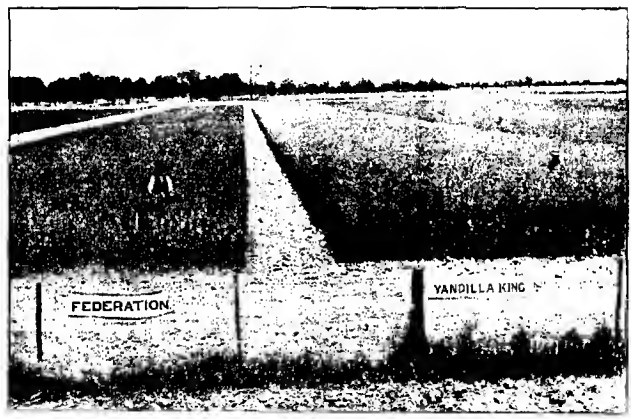
GLUYAS.—This variety is very popular in the Mallee districts of South Australia on account of its early maturity, general immunity from disease—particularly its rust-resisting powers—and its capacity for yielding well in dry seasons. It is a vigorous, moderately tall growing, early variety, of fair tillering power. It is, however, somewhat weak in the straw. The ears are dark-bronze in colour, moderately compact, and possess a slight tip beard. As the grain approaches maturity the dark heads become pendent, but do not shell on account of the firmly closed enveloping glumes. It is a very useful variety for sowing in dry districts in a late season, and is one of the most promising of the early varieties for Mallee districts. Large quantities of seed of this variety have been sent to South Africa, where rust-resistance is a quality that is highly prized. There have been a number of inquiries from Queensland regarding this variety.

KING'S EARLY.—This is another very popular early variety in South Australia Mallee country, and yields well in dry seasons. It is a selection made many years ago by the late Joseph King, of Georgetown, South Australia. It is a vigorous tall-growing variety, of moderate stooling capacity, possessing semi-solid straw, with a fair amount of flag. The ears are bearded, white, somewhat open, and the grain large, plump, and of low strength. In spite of its beard, it is prized as a hay wheat on account of the solidity and sweetness of its straw, and the capacity of retaining its colour well. It is a very old variety, but during recent years it has been greatly improved in yielding capacity by selection. It is useful for late sowing when seeding operations are backward.

BAYAH is a cross-bred wheat with improved Fife and Jonathan parentage. It is a mid-season variety which very closely resembles

Federation in the colour of the chaff and the short, upstanding straw. It is a very vigorous grower, of good stooling capacity, with well-developed, shapely dark-brown, compact ears with clubby tips. The chaff is smooth, but the spikelets near the tip are slightly awned. The grain is plump, soft, and white. On account of the short stiff straw it is not suited for hay, though its grain yields have been very satisfactory.

COMMONWEALTH. This is one of the new varieties produced by Mr. Pye, Principal of the Dookie College, by cross-breeding. It is not unlike Federation, both in habit and general appearance, being short in the straw and possessing a bronze beardless head, somewhat prone to shed its grain. It is a promising variety, has done well in departmental tests, and is worthy of trial in the northern areas. It has yielded well during the past season.



View of "Seed Plots," Rutherglen Experiment Farm. The produce of these plots is sown on the bulk areas for distribution as seed.

CURRAWA.—This is another of Mr. Pye's crossbreds, and in the field is an attractive looking wheat. It is a free-growing variety, of good tillering power, producing a fair amount of straw, and has bald, creamy-white, compact, square, well-developed heads. This variety has given very good yields in the northern areas, and is likely to achieve considerable popularity in these districts. It should certainly be worthy of trial by farmers in the northern areas, and may be expected to give good yields in seasons with late spring rains.

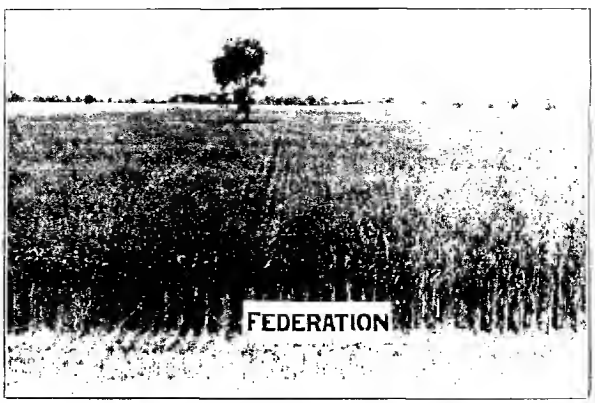
DART'S IMPERIAL.—This popular variety was originated by Mr. Thomas Dart, of Nhill, Victoria, formerly of Lucindale, South Australia, and is a selection from a purple straw variety. It is one of the oldest varieties in general cultivation at the present time. It is a good all-round grain and hay wheat, and is a very reliable yielder in most wheat districts. It is a tall-growing variety, with good stooling powers, but hollow stemmed, and possessing considerable

foliage. The heads are well developed, square and compact, with broad, smooth, cream-coloured spikelets, somewhat crowded towards the tip, giving the top a club-like appearance. The chaff is smooth, but possesses slight awns towards the summit of the head. The grain is soft, white, and mealy, and not of high strength. The grain is easily milled, and it belongs to the weak flour group of wheats, though the colour of the flour is excellent. In Departmental variety tests the yields of Dart's Imperial have usually stood out prominently, and confirm the opinion that this variety is a good prolific standard type for most of the wheat areas.

FEDERATION.—This is, without question, the most popular and prolific variety of wheat in general cultivation at the present day. It was produced by the late Mr. Farrer, Wheat Experimentalist, of New South Wales, from a cross between Purple Straw and Yandilla. Yandilla is a cross between Improved Fife and Etewah, an Indian variety. The production of this wheat was probably the greatest of Mr. Farrer's many triumphs in wheat breeding, for none of his many successful crossbred wheats have enjoyed such a wide measure of popularity as Federation. Indeed, during the last six years the golden yellow characteristic of old-time Australian harvest fields has been gradually changed to a dull bronze through the ever-increasing popularity of Federation wheat. This popularity has been won by sheer merit, for Federation, when seen in the field for the first time, is decidedly unattractive in appearance, especially when grown side by side with the showy wheats of the Purple Straw type. Most farmers in growing it for the first time have expressed great surprise at the yielding capacity when the wheat was taken off, for the yield invariably exceeded the expectations based on pre-harvest estimates. As a matter of fact, Farrer's main aim in producing Federation was to produce a variety suited to the Australian methods of harvesting with the stripper. Federation is a short, erect-growing variety of moderate stooling capacity, with broad, semi-erect, light-green foliage. It has short, upright, stiff straw, unaffected by some of the most violent storms. It may be regarded as a variety in which there is a maximum of grain to the minimum of straw. Its chief feature is its extraordinary prolificacy. It was not intended for nor recommended as a hay wheat. It is essentially a grain yielder. It possesses a bold, square, beardless, compact head, with a peculiar and characteristic bronze cast, broad, well-developed, smooth spikelets. As might be expected, there are numerous strains of Federation on the market. In many, the original squareness and blocky nature of the head, characteristic of the variety when it emerged fresh from the breeder's hands, have to a large extent disappeared. Federation is susceptible to fungus diseases—especially rust and flag smut, and, to a lesser extent, "take all" (*Ophiobolus graminis*). Were it more disease resistant and earlier in maturing, it would be ideally suited for the more arid areas. The grain is very liable to suffer from bleaching, especially in a showery harvest, owing to the fact that, unlike many of the older wheat varieties, the ear stands upright when ripe, and allows rain to readily penetrate the ear. Its grain is soft, white, and plump, and yields a good percentage of flour of creamy-yellow colour. Though the strength of the flour is considerably lower than Comeback and Bobs, it is higher than the Purple Straw wheats.

MAJOR.—A late maturing variety, with good stooling powers, creamy-yellow, compact, bald heads, spikelets rather densely packed near the summit. This is a new variety, bred by Mr. Pye, of Dookie College, and promises to be of value for late districts.

MARSHALL'S No. 3.—This is one of a large number of varieties originated by that successful wheat breeder, Mr. R. Marshall, late of Templars, South Australia. It is a late wheat of good tillering capacity, but rather slow growing when young, with a somewhat spreading habit, and broad, dark-green, drooping leaves. It is somewhat rust resistant, but its late maturity is an objection for the drier districts. The straw, when ripe, has a purplish tinge, stands up well, and bears a beardless, somewhat open head of fair length, carrying smooth, broad spikelets,



View of Bulk Area of Federation Seed Wheat, Rutherglen Experiment Farm.

with a slight tip beard. The grain is soft, white, plump, and of fair size, and of fair milling quality. It is very popular in South Australia, New South Wales, and Queensland, and has been very widely grown for hay.

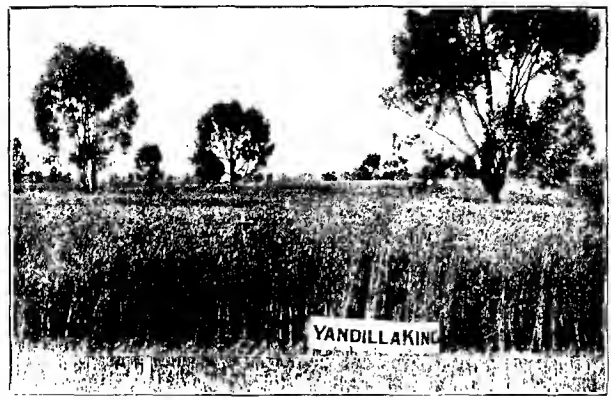
PENNY.—This variety was introduced from Bungaree, South Australia, by Mr. E. H. Lascelles, Geelong. It has done remarkably well in the Mallee. Mr. Lascelles grew it at Tyrrel Downs in 1912, and averaged 7 bags to the acre on a year's rainfall of 9.9 inches, the next best variety giving but 5 bags.

In 1914, though only 5 inches of rain fell for the year, the average yield of Penny was 5 bushels per acre, whilst no other variety gave more than 2½ bushels.

It is a strong upright-growing variety, maturing rather late, and looks very attractive in the field. The heads are well developed, compact, beardless, creamy-white in colour, with rather densely crowded spikelets near the summit.

It is likely to become a popular variety, and has the dual qualification of being a good grain yielder and a fair hay wheat, and, in addition, it appears to give satisfactory returns in the driest seasons.

YANDILLA KING.—This is another of Mr. Marshall's crossbred wheats, and is a half-sister to Federation. It was obtained by mating Yandilla and Silver King (a white-strawed variation of Marshall's No. 3). It is a late wheat, with good stooling propensities, and, like Marshall's No. 3, is a somewhat slow grower in the early stages. The *ripe straw is stiff, hollow, and upright, on the short side*, bearing large, well-developed, shapely, beardless heads, creamy-white in colour, with broad, close-set smooth spikelets. The chaff adheres closely to the grain, and renders stripping somewhat difficult. The ear is slightly tip bearded, and the grain large, plump, medium hard, white, and of good milling quality. It has been a consistently heavy yielder, and has done well in departmental variety tests, and must be regarded as one of the most prolific and reliable grain varieties in general cultivation.



View of Bulk Area of Yandilla King Seed Wheat, Rutherglen Experiment Farm.

HUGUENOT is a very tall-growing wheat of the macaroni or durum class. It stands up well, frequently growing to a height of 6 or 7 feet. Its straw is practically solid, and very sweet in character. It *is a poor stooler, and must, therefore, be sown very thickly.* This is the more necessary on account of the large size of its grain. Its early growth is erect, and of light-green colour, and the leaves broad and stiff. Unless sown thickly, the straw goes up like miniature bamboos. The head is very dense and compact, being dark-brown in colour, with a cast of purplish black. The spikelets are densely crowded, and give the ear a club-like appearance. The grain, which is long, hard, horny, angular, and slightly pinched, adheres closely to the chaff, and makes the wheat difficult to strip. This difficulty is increased by the fact that the wheat is invariably a tall grower, and possesses very prominent top nodes, which latter often choke the comb of the stripper or harvester.

It is a macaroni wheat, and not a milling wheat. Its gluten content is high, but the colour of the flour is very objectionable. It is a very poor yielder, and will not pay to grow for grain at f.a.q. rates. It is essentially a fodder variety, being grown either for hay or ensilage. As a hay wheat it gives an exceedingly heavy cut, yields up to 4 and 5 tons per acre being frequent in South Australia. Mixed with varieties like Baroota Wonder, Majestic, or Calcutta Cape Oats, it gives heavy cuts of good quality sweet hay. It is smut resistant, and relatively rust resistant. The cost of seed wheat of this variety is usually high, but it could not be produced with profit at ordinary f.a.q. rates on account of the low yield of grain per acre. It is suitable for forage or hay purposes, but should not be grown for grain.

WARDEN.—A late-maturing variety, noted for its fine hay qualities. A tall-growing wheat, with nice thin straw, makes good quality hay, and retains its colour well. The head is open, beardless, white, and tapering; grain hard, dark red, and glutenous. It is a very popular hay wheat in Victoria.

ZEALAND BLUE.—A cross between Tardent's Blue—a good hay wheat—and Zealand—a variety of the Lammas type. It is a tall-growing, medium late variety, with good stooling powers, and strong straw. This variety has done well as a hay variety, especially in the cooler wheat areas. The head is long, beardless, slightly tapering, with characteristic velvety chaff. The grain is large, plump, and medium hard, of very attractive appearance, and of good milling quality.

It should always be remembered that the best cows pay the best for looking after. They pay for better food and more of it than the poor ones, and should have the greatest amount of attention generally. The capability of responding to this good treatment is greater than that of a poor milker.

Senator Sherman, of Illinois, United States of America, said in a recent speech that the day had gone by when the boys who were not bright enough to make lawyers or doctors stay on the farm. Nowadays it is the boy who is not smart enough to make a successful farmer who goes to town to become a doctor or lawyer.

Cows with their third or fourth calves should be carefully observed after calving, especially if they are deep milkers, as at this period they are very apt to develop milk fever. If a cow is lying down with her head turned into her side, you should go to her and place her head in a different position. If she persists in returning it to the old position again, you may know that she has milk fever.

NHILL AGRICULTURAL SOCIETY ANNUAL CROP AND FALLOW COMPETITIONS, 1915.

Report of the Chief Field Officer, Mr. Temple A. J. Smith.

The Secretary, Nhill Agricultural Society.

Sir,

It affords me much pleasure to submit herewith my report on the Nhill Crop and Fallow Competition for the year 1915. The elimination of the competition for best farms, owing to the serious drought of 1914, has naturally robbed this function of a considerable amount of its usual interest, and though the Society probably acted wisely under the circumstances, the wonderful recuperative powers of the district, as evidenced by the very fine crops and natural growths seen during the recent inspection, go to show that the farms might well have competed again in 1915 without loss of prestige as compared with previous years.

General Impressions.

The marvellous recovery in one short season from the greatest drought ever experienced is perhaps the outstanding feature of the past two years. The crops now in the field are exceptionally fine, and the area to be harvested is considerably above the average. The prolonged ripening season just experienced will give the wheat crops every opportunity of filling well, thus causing heavy yields of good plump grain. Oat crops are also finer than usual, and an enormous quantity is being cut for hay. Some idea of the quantity taken off is conveyed by the fact that in many cases over large paddocks of 100 acres and more a ball of twine per acre was required to tie the crop; on one field of 40 acres no less than 55 balls of twine were found necessary.

In addition to the oat crops grown for hay a quantity will be stripped for grain, and here a pertinent question may be put with advantage as to the disposal of oats when prices are low, as compared with their value when fed to stock on the farm. The prevailing opinion amongst farmers is that oats will be saleable at anything down to 1s. 6d. per bushel. Victoria does not export oats to any extent, consequently, when the supply exceeds the demand values are low. When such conditions prevail, there can be no doubt that feeding oats to stock on the farm will pay better than selling at 2s., and some experienced farmers say 2s. 6d. per bushel. The effect of such a practice would be not only to make the greater profit at home, but also to maintain a better market for those who sell. With meat at high prices, and likely to remain so, the feeding of oats to stock is a still better proposition. At the present moment the supply of natural feed is in excess of the demand made upon it by stock, but the winter months will tell a different tale, and as every practical man is aware, the prices for fat stock are, generally speaking, at their highest at that time.

Another pleasing feature was the cutting of wild oat crops on a much larger scale than previously for hay. Yields of 2 tons per acre from this natural growth were not uncommon. Many of the lanes were growing wild oats which would cut 1½ to 2 tons of hay, and in some cases crops

were cut in them of these dimensions. This practice might be extended with advantage and profit. The cost of conserving hay of this description amounts to about 10s. or 12s. per ton, consisting of cutting, carting, and stacking; as a reserve supply for bad seasons its value would be ten times that amount, while under normal conditions it would largely increase the stock-carrying capacity of the farm.

Left to ripen and shed their seed in seasons like the one being experienced, they are a menace to safety in case of fire, and the cause of many dirty crops.

Water Supply.

The drought just past has had its good effects as well as bad, as one of Nhill's most progressive farmers (Mr. E. J. Hoffman) remarked. It had forced him to put down a bore for water, a thing he should have done long before. The water so obtained is of excellent quality for stock and domestic purposes, and where used for irrigation has proved beneficial. Further, there appears to be an inexhaustible supply. The value of this sub-artesian water to the Nhill district can scarcely be over estimated; it not only means safety in times of drought in regard to water for stock, but should be largely instrumental in providing green succulent feed at all times. The rich black country, of which there is a large area, is in most cases admirably suited to the growth of lucerne and other fodder crops. Small plots of this king of fodders were seen on some farms, and there appears no reason why areas of 10, 20, and 100 acres of lucerne should not be grown under irrigation supplied by bores in the future, rendering the owners of such areas independent of the seasons, and assuring a competence on smaller holdings, in addition to which would accrue the enhanced value of the land.

With the warm climate, the rich black soil, and a sufficient supply of water, lucerne should thrive as well, or better, than in any other portion of the State. It was noticed on some farms where bores had been put down that the distributing tanks into which the water was pumped were placed on low stagings, often only a few feet from the ground. This is a mistake, as for practically the same cost the staging could be made 12 feet or more, the resulting pressure being of considerable value in the saving of time when the water is used for garden purposes, the hosing of horses, buggy, &c., and particularly in case of fire.

Losses Due to Drought.

Inquiries were made on each farm visited as to the losses sustained during the past exceptionally bad drought, and it is extremely satisfactory to be able to say that less stock was lost as the cause of the drought than was probably the case in any other of the northern areas of the State. In no case was a serious loss quoted, and though some hay was imported by individual farmers, others sold large quantities at high prices. Horses are plentiful, and no difficulty is expected in connexion with harvesting operations. When the comparative immunity from loss in this district is compared with that of other supposedly more favoured places, a field of speculation is opened as to which is really the safest part of the State in which to invest capital.

On Mr. John Dart's farm a field of grass, known locally as rye-grass was seen of exceptionally strong growth, which was highly spoken of as

a drought resister. Though resembling rye-grass, it is certainly not English or Irish rye, and being perennial in habit differs from Italian rye and Westernwolth. Samples have been submitted to the proper authorities to have the variety placed. Stock are fond of it, and thrive upon it, and as it apparently does well on sandy, black, and red soils it should be a useful acquisition to the Wimmera. A further grass that might be experimented with, especially on the black flats, is that known as Subterranean Trefoil, a very small quantity of seed, 1 lb., being sufficient per acre.

Progress Noticeable.

Though it is only three years since I had the honour of judging these competitions, a noticeable degree of progression is apparent, and this in spite of one year of the three being practically non-productive. Many new homes have been built on up-to-date plans, telephones are laid on to almost every farm of importance, new bores and dams have been put down, nice gardens and orchards surround the houses, and, generally speaking, the whole countryside looks prosperous and comfortable. Fresh land has been cleared and brought under cultivation, and unmistakably better methods are being followed in cultivation and cropping, largely as a result of the farm and crop competitions and the evidence and information they have assisted in obtaining. Some of the new homesteads have been laid out with a view to later on competing for the Society's prizes. Early fallow with careful cultivation is more general; crops in some cases have had all foreign heads culled by hand, and larger quantities of manure are being used. Hints thrown out by previous judges have been acted upon with advantage, a case in point being the making of an elevator for stack-building, made by Mr. J. Jordan, of Woorak, for Mr. Peter Bone, on the lines suggested. This machine, which is cheap, durable, and easily constructed, saves all the pitching upward of sheaves above the 11-ft. level, saving thereby time and labour.

Though many dirty crops were seen in the 300 miles traversed during the inspection of this year, those exhibited, and also some others, were cleaner than was the case in former years, and here it might not be out of place to say that many of the crops not entered for competition should have been included, both from an individual point of view, and in the general interest of the Society that is doing so much for the Wimmera. That farm and crop competitions tend to stimulate better methods and practices cannot be denied, and it is a pity that other Societies do not follow Nhill's example in this respect.

Where Improvement is Possible.

Probably the greatest improvement in farm practices in the future will be made in a better system of rotation cropping, greater use of the sub-artesian water, seed selection, and the use of increased quantities of manure. There is room, too, for better cultivation methods in many cases. The present rotation is to some extent wasteful, in that a year or two is devoted to spelling the land when the growth of certain rotation crops would bring about a quicker release of the essential plant foods in the soil, at the same time paying well for their cost in labour, manure, seed, &c. The growth of rye and vetches, particularly on the sandy and red soils, would have the effect of supplying humus, an element these

soils are much in need of. Nitrogen in the available form would be stored up at a greater rate, and phosphoric acid released in greater quantity than where the land is thrown out only. The cost of seed, cultivation, and manure would be less than 20s. per acre, and from the mixture, fat lambs, to the number of three to ten, according to the growth of the crop, could be turned off. Taking the value of the lambs at 12s., and the minimum number fattened at three per acre, this would leave a net balance of 16s. per acre. The land would be left in better condition to produce the next wheat crop, and would also be more friable and easily cultivated, which in the case of the red land especially would be a great advantage. Where such crops are grown as a rotation they should not be allowed to ripen, but should be fed green, and ploughed under in the late spring. Manure should be used to stimulate a better growth, and so help to bring about a further beneficial residual effect. Rape and peas are also useful rotation crops for wheat, and also the clovers where they can be successfully grown.

The extended use of water for irrigation would enable many new crops to be grown in the Wimmera in the shape of millets, sorghums, and clovers, which would enormously increase the carrying capacity of the land. Lucerne under irrigation would not only yield large returns, but if satisfactorily established would increase the value of the land suitable for its production from five to ten times its present estimate.

That better cultivation methods could be more universal is evidenced by the crops themselves, and in the annual returns obtained by certain farmers in good and bad seasons. The good farmer will get the better return simply owing to his improved practices, and for the sake of another stroke of the harrows or cultivator very often an extra 2 or 3 bushels per acre is lost, and it is the extra bushel that is all profit.

In seed selection there is a great future for improved yields. Graded seed in the tests at the different Research Farms shows a difference in the returns of 14s. per acre when comparing the best grade with the worst. How much more might be expected from carefully selected seed from the most prolific plants, true to type, and persevered with for several seasons. Small plots of 3, 5, or more acres used as stud plots each year from which the best seed was selected for the next year's stud plot, and the bulk sown on the main crop, would not entail much work, and would lead to increased production and bigger bank balances.

Where larger quantities of manure have been in use than the average, heavier crops have been harvested. There is a limit, under some circumstances, to the amount which gives the most profitable return and this will vary according to the quality of the soil operated upon.

Where the soil and water supply is capable of producing a 30-bushel crop per acre, the amount of nitrogen taken by such a crop is a little over 40 lbs. This special food can be obtained by early fallowing, and the growth of the rotation crops mentioned; and a continual supply can be taken from the atmosphere year after year in the same way. With respect to the next most important food, known as phosphoric acid the case is different: no supplies can be drawn from the air, and the whole requirement of the crop is taken from the existing fund in the soil. A 30-bushel crop takes over 20 lbs. of phosphoric acid for its development. When we apply 50 lbs. of super, we contribute just half the phosphoric acid required, and so must rely on the soil store for the balance, and if that is not there in the available form a 30-bushel crop is impossible.

Moreover, unless we put into the soil as much phosphoric acid as the crop removes, we are gradually making the soil poorer and poorer, rendering longer spells necessary, and ultimately running the soil right out. It must, therefore, be a good business proposition to use more super.; 1 cwt. per acre would be sufficient to enable the soil to give a full return for the labour, seed, &c., expended upon it in other directions. Further, where a full amount of phospohric acid is available, less moisture will be necessary to produce a crop, as all the food is taken up in solution, and the stronger the solution the less the quantity of water is transpired through the leaf system to provide nourishment. The soil's fertility would be maintained for future crops, and even if the land were allowed to return to grass, better food values in the fodder would obtain. When farmers generally realize that their yields are practically governed by the water, nitrogen, and phosphoric acid supply, and any deficiency in any one of those factors means smaller returns, one great step in the right principles of farming will have been mastered.

The results of the crop and fallow competitions are submitted with comments herewith:—

No. 1.—Nhill Crop Competition.

For best exhibited half of wheat crop not less than 75 acres.

Name.	Location.	Freedom from Weeds.	Disease.	Purity and Trueness to Type.	Evenness.	Apparent Yield.	Total.
Maximum points ..		15	15	20	15	35	100
G. Crouch ..	Kaniva ..	14	14	17	14	33	92
O. H. Lienert ..	Lorquon ..	13	13	18	14	32	90
Voigt and Sallman	Mt. Elgin ..	13	14	17	12	30	86
H. Scroope ..	Diapur ..	12	12	17	13	30	84
G. H. Voight ..	Winiam ..	13	12	17	12	30	83
R. Blackwood ..	Kata East ..	12	14	14	11	30	81
F. W. Habey ..	Salisbury ..	11	13	16	11	30	81
W. Krelle ..	Woorak West	13	12	13	12	31	81
B. Schultz ..	Ni Ni Well ..	12	11	11	12	28	80
J. Collins ..	Woorak ..	13	13	13	11	30	77
J. Dart ..	Nhill ..	12	11	12	10	24	69

P. H. J. Goudwin retired from the competition, on the ground that his crop was not good enough.

No. 2.—Mallee Crop, 100 acres.

Name.	Location.	Freedom from Weeds.	Disease.	Purity and Trueness to Type.	Evenness.	Apparent Yield.	Total.
Maximum points ..		15	15	20	15	35	100
D. R. McKenzie..	Glenlee ..	12	14	15	13	30	84
T. Miller ..	.. ..	12	12	14	12	30	80

No. 3.—Fallowed Land, 100 acres.

Name.	Locality.	Moisture.	Freedom from Weeds.	Mulch.	Cultivation.	Total.
Maximum points ..		25	25	25	25	100
E. J. Hoffman ..	Winiam ..	24	23	24	24	95
P. Bone, junr. ..	Kiata East ..	22	22	24	24	92
G. Crouch ..	Kaniva ..	20	22	24	24	90
D. R. McKenzie ..	Glenlee ..	20	20	24	23	87
R. Blackwood ..	Kiata East ..	20	20	21	21	82
O. H. Lienert ..	Lorquon ..	17	20	20	20	77

No. 4.—Wheat Crop on 1915 Fallow.

Name.	Locality.	Moisture.	Freedom from Weeds.	Mulch.	Cultivation.	Total
Maximum points ..		25	25	25	25	100
E. J. Hoffman ..	Winiam ..	24	23	24	24	95
P. Bone, junr. ..	Kiata East ..	22	22	24	24	92
G. Crouch ..	Kaniva ..	20	22	24	24	90
R. Blackwood ..	Kiata East ..	20	20	21	21	82

In the crop competition for best half of crop, Mr. G. Crouch, of Kaniva, comes first, a fine performance when the area, 700 acres, is taken into consideration. In addition to his fine crop of Federation wheat, Mr. Crouch has crops of Gluyas, College Eclipse, and Lots, every one of which is very good. The Gluyas, an early variety, popular in South Australia, and less liable to disease than most wheats, is a nice crop, very clean and pure, and showing a beautiful plump grain and colour. The ears are dark-bronze with a slight tip beard. It has, however, a weak straw, and the crop under review showed a tendency to go down, though not so badly that it could not all be taken off with the harvester. In dry seasons this should prove a valuable variety for the Wimmera. The crop of College Eclipse was also a fine one, growing however, rather too much straw inclined to be weak, the heads being well filled and compact.

The Lots wheat is a variety resembling Darts Imperial, being later in maturing, growing plenty of straw, and should be a useful hay wheat as well as a prolific grain yielder.

The Federation on this farm was exceptionally good and heavy, and the special features of all the crops seen on Mr. Crouch's farm were their evenness, purity, and freedom from disease. The all-round yield, too, should be extremely good. These results evidence careful management in cultivation, seed selection, and general treatment. Some very nice crops of oats and barley were also noticed.

Mr. O. H. Lienert, of Lorquon, is a good second with some fine crops, notably 100 acres of Yandilla King. This crop, though containin a few wild oats and small patches of takeall, was a particularly nice one, exceptionally well headed, and should yield a big result. His crop of Federation, however, was not equal to some others seen.

Messrs. Voigt and Sallman, of Mt. Elgin, showed a nice crop of Federation, on red ground, clean, and free from disease, with very few foreign heads. This crop should yield well, but was inclined to be thin in patches.

Mr. H. Scroope, though not securing a prize, showed some fine crops in his 600 acres exhibited, included in which were Federation, Purple Straw, Marshall's No. 3, and Zealand Blue. These crops were not as clean or even as the prize crops, but were nevertheless good.

Both Marshall's No. 3 and Zealand Blue are rather late varieties, and perhaps better suited to cooler districts; they are both good hay wheats, but would not be suited by dry seasons.

The task of judging the crops on this occasion was not easy, as, taken all round, there was not a very great difference in yields, as the points awarded indicate. But there was a considerable variation in respect to purity and evenness.

The crops generally were fairly free from disease, though patches of takeall, slight touches of rust, and a little smut were observable in various instances. Dead heads were not numerous, and wild oats not as plentiful as is generally the case and most of the crops were clean in the bottom.

The best crops this year were grown on the black ground, which was evidently suited by the season, and it might be worth the attention of the Society in future as to whether a separate prize for crops on red and black ground be offered, as the different classes of soil are liable to place exhibitors in a somewhat inequitable position.

In summing up the points allotted, attention has been drawn to the fact that those farmers in the habit of using larger applications of manure are getting better crops than their neighbours.

The habit of harrowing crops after they have grown a few inches does not appear to be as general in this district as in some others. The red ground especially would respond to such treatment, particularly if the surface has set or caked, and the ravages of takeall be checked as a result, in addition to which moisture would be better conserved and the air more freely admitted to the roots of the crops.

The amount of seed used varied from 30 to 60 lbs. per acre; the best results apparently coming from applications of from 50 to 60 lbs.

The opinions of most of the oldest farmers were in favour of shallow sowing, and in this I think they are right, provided the land has been properly cultivated—2 inches to 2½ inches being the maximum depth at which seed should be deposited. The germinating seed likes warmth, moisture, light, and air for its prompt development.

The growth of oats in rotation without additional manure is not to be recommended; better filled oats and heavier yields of grain would compensate the grower, and the land be of greater value either for grass or succeeding crops.

The pickling of seed is still done haphazardly in the majority of cases, and consequent loss takes place, as the strength of the solution is generally too high, and a certain proportion of the seed germs is

destroyed. The right quantities are 1½ to 2 per cent., or in other words, 1½ to 2 lbs. of bluestone to 10 gallons of water. This is sufficiently strong to kill the spores of smut, and at the same time injure the grain as little as possible.

Mr. Crouch, of Kaniva, favours formalin, and his results are certainly encouraging. The strength used being one in 400, *i.e.*, 1 lb. in 400 lbs. of water.

Pickling with formalin requires more careful treatment than bluestone, as re-infection is more liable in smut-infested soil, or in seed in which the smut balls have not been removed.

In conclusion, I must take this opportunity of thanking Messrs. T. Walters, T. W. Durant, A. F. McGill, and John Young for their generosity in providing motors and drivers to facilitate the work, which with horses would easily have occupied twice the time employed. The usual Wimmera hospitality was enjoyed in all places visited, and a valuable interchange of ideas thoroughly appreciated by the judge. The Wimmera farmer takes a wide view of matters pertaining to farm pursuits, and he should be grateful to the fate that enables him to live in a part of the world where large aspirations are capable of fulfilment, and where the actual extent of his operations and surroundings has a broadening influence.

The success of the Nhill competitions is undoubtedly due in great measure to the energy, perseverance, and excellent organization of the Society's evergreen secretary, who spares no time or trouble in his efforts to forward the interests of the district.

I am, Sir,
Yours faithfully,
TEMPLE A. J. SMITH,
Chief Field Officer.

MALLEE CROP No. 2.

There were two entries only in this section, Mr. D. R. McKenzie securing first prize for a crop of Federation, even, thick, and clean. *This crop had the foreign heads picked out, and was healthy.* Mr. Miller's crop was also a good one, but contained some dead heads and slight patches of takeall; it was, nevertheless, well worthy of second prize.

FALLOW COMPETITION No. 3.

Mr. E. J. Hoffman scores a meritorious win in this section, his fallow being as nearly perfect as possible, with the exception of an odd weed or two. The moisture content was very fine, and cultivation even throughout, both the red and black soil getting consistent treatment. This was not the case in some of the other exhibits where the black soil was in good order, but the red patches had become consolidated, and were simply scratched over the surface by the implements used.

Mr. Peter Bone also showed a very nice fallow which ran Mr. Hoffman's closely, but was slightly inferior in moisture content, and carried a little more weed. It was nevertheless a fine exhibit.

Of the others, Mr. Crouch was next best, while the remaining exhibits in this class would have been better for further cultivation, and were not as uniform.

Fallow No. 4.

As would be expected, the same competitors take similar positions in this section, and it will be interesting to see next year how the effect of these fallows will affect the succeeding crops. On the whole, the fallow exhibits were good, and in this department of farming the Winmera farmer is hard to beat.

Early fallowing means not only more moisture, but more available nitrogen, and the release of greater amounts of phosphoric acid and potash, a firmer and finer seed bed, and, given a normal season, bigger crops.

Working the land at the right moment has important effects in respect to fallowing, and with the red ground particularly, which if allowed to bake, is difficult to cultivate, this applies with much force. In fact, doing the right thing at the right time is one of the great secrets of farming generally.

In a natural state, animals live on green fodder; it is their natural food, and, as a consequence, they thrive on it. But when animals, as in present-day farming, have been domesticated, the case is a little different. Care requires to be exercised in changing the diet from dry to green food. It should not be done too suddenly. The green stuff should be fed in combination with old hay, the green fodder being gradually increased and the proportion of hay reduced.

Lucerne is one of the most nourishing animal foodstuffs, as is indicated by the analysis of the plant. When it is coming into bloom it contains the following percentages:—Albuminoids 18.47, fat 1.14, carbohydrates 64.04.

Provide plenty of clean, fresh water for the calves during hot weather. Those getting milk require water in addition to their other drink, and it is surprising what a quantity they will utilize.

Roughly speaking, the number of sheep estimated to be in existence at the present time is some 615,000,000. Of these, one-third at least are found within the confines of the British Empire. This fact at once shows the importance of the flock-owning industry to the welfare of our own Empire and country.

PLANTING AND RECONSTITUTION OF VINEYARDS.

CONDITIONS GOVERNING THE DISTRIBUTION OF PHYLLOXERA-RESISTANT VINE ROOTLINGS AND CUTTINGS.

During the past two seasons the conditions subject to which Victorian vine-growers may purchase phylloxera-resistant vine cuttings and rootlings, whether grafted or ungrafted, have been published in this *Journal* in full detail, so that growers should now be familiar with such conditions, which will again apply to the coming distributions (Ungrafted Rootlings and Cuttings, season 1916; and Grafted Rootlings, season 1917), the only alterations being the necessary correction of dates, viz., the substitution of the year 1916 for 1915, and of 1917 for 1916, respectively.

It will suffice here to explain that resistant vines are supplied to intending planters in any of the following forms, and at the prices stated, packing extra:—

Resistant rootlings, grafted with scions previously supplied by applicants, at per 1,000, £6.
Resistant rootlings, ungrafted, at per 1,000, £1 10s.
Resistant cuttings, at per 1,000, 15s.

Application Forms.

No application will be entertained unless made on the forms supplied for the purpose, which are obtainable from the Director, Department of Agriculture, Melbourne, or from the Principal, Viticultural College, Rutherglen.

Separate forms are provided for (*a*) Grafted Rootlings (blue form), (*b*) Ungrafted Rootlings and Cuttings (buff form). Applications must be filled in on the proper forms.

Each applicant for forms will be supplied with a copy of the detailed conditions governing the distribution of phylloxera-resistant vine rootlings and cuttings.

Applicants are earnestly requested to thoroughly familiarize themselves with them. *They are warned that under no circumstances can any departure be permitted from the regulations governing the distribution as detailed therein, nor can any request for special consideration be entertained.*

Dates before which Applications must be made.

For Grafted Rootlings (1917 distribution, June to August inclusive). Applications will be received until 31st May next. (For the 1916 distribution the time for receiving applications closed on 31st May, 1915, and present applicants cannot be supplied until 1917.)

For Ungrafted Rootlings and Cuttings, to be distributed from July to August inclusive, 1916, applications will be received until 30th June, 1916.

Supplying Clean Districts.

Rootlings and Cuttings cannot be sent from nurseries in phylloxerated districts to clean districts. A limited number of clean Ungrafted Rootlings are, however, available for distribution to clean districts. The price charged is £2 per 1,000, packing extra. Applications for these will be received by Mr. E. E. Pescott, Principal, School of Horticulture, Burnley, until 1st June, 1916.

HERD IMPROVEMENT.

Breeding for Butter Fat.

By B. A. Barr, Senior Dairy Supervisor.

Apart from the value of feed, the principal factor in breeding for butter fat is selection:—1st. When purchasing untested cows, select on dairy type. Dairy type is a term glibly used, yet difficult to define; it exemplifies a type which is the result of the development of the special purpose dairy cow. 2nd. Proving the earning capacity of the selected animals and all cows in herd by use of Babcock tester and scales. 3rd. Selection and use of a pure-bred dairy bull, whose immediate female ancestors have proved profitable butter-fat producers.

To the stock-breeder the maxim "like begets like" is delusive, inasmuch as no two animals are exactly alike in all unit characters; and even if it were possible to breed from animals possessing exactly the same external characters as measured by the eye, we have no means of determining beforehand those characters which have passed to the animals from previous generations. Characters which, although not apparent in the parent, may appear in the offspring. The conformation of the bull does not assure the breeder that he will have profitable dairy cows even when used with a breed of good dairy cows. The character of milking capacity is not visible in the bull; but if his female ancestral line were profitable one may reasonably anticipate this quality to be transmitted to the heifers. In the practice of breeding it is not only necessary for the dam and sire to possess those qualities which are desired in the offspring, but it is equally important that such qualities should have been possessed by the immediate ancestors. Although the above maxim is misleading, breeding is not a matter of chance. The germ cells of the cow and bull contain bodies which determine the transmission of hereditary characters. These determiners act as a link between the conjugating male and female blood strains as well as between successive generations. For this reason frequently a calf is born differing greatly from the parents, but showing a marked resemblance to some remote ancestor.

The system to be practised in breeding dairy cows should lead to an accumulation of those characters which are associated with milk production. It is remarkable that no determined effort is made by dairy farmers to increase the earning of the herd from year to year. Where an effort is made the general practice is to cull by selection on type; but type does not cause a cow to be a profitable milker. It is the result of a continuous variation in response to the extraordinary development of the udder as a secretory organ. Dairy type is the result and not the cause of udder activity. Consequently it can be readily understood that cows may possess this type and yet be unprofitable. The type may be given by the cow, and the bull, being from a line of unprofitable milkers, may transmit poor milking quality to his stock. The capacity of a cow to secrete a heavy flow of milk or large amount of butter fat is not regulated by type. It is inherent, and according to its degree only is it proportional to the amount of food consumed. If the amount of butter fat were proportional to the amount of food consumed, all cows consuming the same amount of food would yield the

same amount of milk. If dairy type controlled the flow of milk, then all cows having the same type and consuming the same quantity of food would yield equal quantities of milk.

Under the influences of continual selection and feeding, the dairy cow has made a marked and rapid change, and differs widely from the original stock, and also from the purely beef breeds, both in type and function. The more noticeable characteristics are—(*a*) the angular or wedge-shaped conformation; (*b*) extreme development of the body by increasing its holding capacity. At best, the dairy cow can only convert the nutrients in her food into the nutrients of milk, and to yield a heavy flow of milk a large capacity for food is essential. For this reason light, weedy, and herring-gutted animals are never profitable: (*c*) a stimulated activity of the udder as a specialized secretory organ. All useful cows yield a greater amount of milk, and for a longer period than is required to rear a calf.

A recognition of these facts is useful when purchasing, because it provides a standard It does not guarantee that cows possessing these attributes will be profitable, but only that with proper treatment they may be so. It is interesting to note that in general these features are common to good milkers. These characteristics constitute dairy type: usually many other features, such as fine shoulders and withers, fine neck and tail, &c., are associated, and at times too much value is given to them. These are subsidiary and not essential features. When general health is manifest, attention need only be directed to those parts most intimately connected with milk secretion. Whilst a fine wither, lengthy clean switch, fine head, and general symmetry are pleasing to the eye, they do not influence the milk secretion. The outstanding characteristic of all heavy producers is the well-developed body. Nature usually maintains a certain correlation of parts, and as the body or "middle piece" of the dairy cow increases in response to the increased activity of the udder, the two ends strengthen to support the added strain resulting in a comparative coarseness, but the amount of milk is not affected, whilst robustness is obtained.

This is particularly noticeable in some of the finer strains of dairy cattle. The robustness and increased development of certain heavy milking families is an outstanding feature in the evolution of the special purpose dairy cow.

The foundation of a dairy herd should be good roomy cows without undue fleshiness. The heavy-fleshed cow costs more for maintenance than the lighter, conditioned animal. Surplus flesh means increased cost for maintenance without any additional return.

The present-day dairy type is the result of certain influences. Two methods which have greatly helped to this end are the use of the Babcock tester and the use of dairy bulls from milking strains. The continued application of these will not only maintain the present standard, but greatly improve it.

The leading factor in the recent development of the special purpose dairy cow was the introduction of the Babcock tester, which when used conjointly with the spring balance provides a ready and correct means of ascertaining the individual worth. It facilitated the process of selection and placed it on a safe monetary basis. It not only provides a means of estimating the value of the cow, but also that of the bull by recording the yield of his female ancestors, and then proving his worth by showing the returns of his heifers.

Having selected or being possessed of a herd, the value of each cow should be proved by weighing and testing the milk. It is not possible to state the earnings of a cow by inspection; no one can enter a yard and definitely state what each cow is earning. It does not follow that because a large amount of milk is given by a cow that she is the most profitable in the herd, nor does a high test indicate a high value. It is the amount of butter fat which counts. Where hand milking is practised the better method is to weigh after each milking, and make a record of such weight. This method is both instructive and interesting. It shows the effect upon the milk yield of any change in feed, and rapidly reveals whether any change or increase in feed produces an increase in milk sufficient to pay for the cost. The system of recording gives a definite value for milk production of any food, and raises it above conjecture or guess work. It eliminates from dairy practice the pernicious habit of "guess and trial." Likewise it is a sure index to sickness in the herd, because frequently in the incipient stages the decrease in yield is not so marked as to be observed by the casual milker. A working method, giving an approximate return, is to weigh one day each month; multiply this amount by the number of days in month, when the sum may be taken as the approximate monthly yield. The test should be made each month.

The object of record keeping is practical. It shows—

(1) Whether the cows keep the farm, or whether the farm keeps the cows.

(2) Which cows are paying for their feed and labour, and which are unprofitable. In every unculled herd there are cows which do not pay for their keep. They not only consume food from which no adequate return is received, but use food which, if given to other cows in the herd, would return a greater profit. The unprofitable take food from the profitable.

(3) From which cows heifer calves should be reared to increase the herd, or to replace the unprofitable. Many a good old cow is culled simply because she is old and replaced by a young duffer. Cows should be culled on their returns, and not on their years. This year (1915) a 16-year-old cow gave 471 lbs. butter fat in nine months, and last year in the same time gave 523 lbs. butter fat.

A second factor in the improvement of the dairy cow was the use of dairy bulls from proved milking strains.

The trite saying "the bull is half the herd" is less than half the truth. The bull either increases or decreases the milking qualities of his stock; in other words, the bull either makes the herd profitable or unprofitable. The bull is more important than the cow. Each cow can influence one calf each season. The bull may transmit his qualities, good or bad, to each of his calves. If under similar conditions the heifers are to be more profitable than their dams, the increased profit must come through the bull, consequently too much care cannot be given to his selection. Whilst dairy type as indicative of milking quality possesses some value in the cow, it is much less in the bull. It does not necessarily follow that because a bull presents a nice appearance, is deep in the flank, level on top line, lengthy between hip and

pin, fine over wither, good escutcheon, and rudimentary teats, and other fancied points which please the eye that he is a fit dairy sire. The essential qualifications of a dairy bull are purity of blood, masculinity, and an authentic record of being descended from females on both dam's and sire's side which have proved themselves profitable producers. These attributes are inter-dependent, and any two without the third renders the whole valueless.

Purity of blood denotes that the animal possesses the blood strains of his particular breed, and when used with cross-bred cows will be more prepotent than a cross-bred bull in which many strains commingle. The pedigree of a bull is more valuable if the families represented are few than if at every union a new family is introduced, because all families possess characteristics peculiar to each, and the continual commingling of these is less effective than if by a gradual accumulation the characters of a few families are centred in the bull. Masculinity with which is associated sexual vigour and general health is a quality quickly recognised but difficult to define. It may be described as a bold, fearless sort of expression.

As dairy cows are bred and fed for milk production no bull is a fit dairy sire unless his female ancestors established their worth as dairy cows. Purity of pedigree and a typical appearance alone do not assure that the bull will get good heifers. The use of a pure-bred bull leads to uniformity in the heifer, while the cross-bred bull leads to inconsistency and mongrelism. It is not reasonable to expect a cheap cross-bred bull, perhaps out of a cow whose milk yield was not sufficient to rear her calf, to show a marked and continual improvement in the heifers. It was for the purpose of supplying dairy farmers with reliable knowledge for purchasing bulls of milking strain that the Department of Agriculture instituted the Standard Herd Test, whereby pure-bred cows, accepted by the various herd books and not ostensibly pure-bred by doubtful pedigrees, are tested each year over a period of nine months. The benefit of this scheme is to show farmers from which cows bulls may be purchased. The average butter fat yield of the average cow is about 160 lbs. during normal years. Last year 165 pure-bred cows averaged 319 lbs. butter fat, and 101 2-year-old heifers averaged 211 lbs. From this it will be readily inferred that the use of bulls from some of these cows would effect a decided increase. Not only are the records of the dams available, but in some cases those of the grand dams on both dam's and sire's side. Such records illustrate how in some families milking capacity is transmitted.

The prices of such bulls are greater than the cross-bred of unknown quality, but it is unreasonable to expect something good at a cheap price. Quality demands its price, and is generally worth it.

Having placed such a bull in the herd, keep him in a small yard, and do not allow him to waste his energies by undue service, such as occurs when running with cows in the paddock. Many make the error of keeping the bull only to get the cows in calf; his use should also be to increase the value of his stock. If a bull is supposed to possess quality he should never be disposed of until his value as a dairy sire is proved by his heifers. Many a good bull has been sold before his value was known. If the heifers are more profitable under similar conditions than their dams, keep the bulls as long as possible if only to serve the older cows, and when necessary to introduce another bull buy one

of the same family as the former, which has already proved profitable. By this method the good qualities transmitted by the first are increased by the second sire. Crossing strains is only a little better than crossing breeds. When it is impossible to keep two bulls the first may be loaned or sold on condition that his services are available when required. When two bulls are kept the first can be used on the heifers by the second, and the practice repeated. So long as the mating animals are robust no harm will result.

WHAT IS EFFICIENCY?

At the present time a great efficiency movement is sweeping the industries. The attention of employers in general is directed toward that one goal as to how to produce the maximum production at the minimum expense. The term speed, or speeding-up, has become a by-word, coined by the so-called efficiency experts, many of whom have been drafted from the rank and file of impractical men. Asked to investigate factory conditions, they file a report with the employers who have been induced to employ them, making a recommendation that in their judgment the only way to increase their output without additional expense is to drive their men, speed them up, make a machine out of them and when worked out replace them. There is nothing scientific in such a recommendation. Every successful scientific invention of the past has had a tendency to reduce the physical labours, and to encourage the individual to think and work with his head rather than with his hands. It is not the aim of scientific management to induce men to act as nearly like a machine as possible. True, a foreman will prove his efficiency by the measured quality and quantity of his output, but it must come through systematic planning and education of the individual. Men must be led, not driven. Instead of working unwillingly for their employer, they must work in co-operation with the management. Mistakes, instead of having to be corrected, must be avoided. So the first thing that must interest is the careful selection of the man that is going to have full charge of any given department. He must first of all be an expert in his line of work. *Nothing is so detrimental as to have a man fall into a position* by luck, without having the necessary qualification. A foreman must be looked up to by the men under him, as one that has had a little more experience than they have had, for it will not take long for the men to find out if such is not the case, and when they do, he will not be able to exercise the proper control over them, and will eventually destroy the efficiency of his department.

The greatest efficiency can be obtained only when the men are happy satisfied, and contented with their surroundings. Since it is hard to find any two men that will do the same amount of work in a given time, discretion must be exercised by the foreman in the placing of his men where they can be used to the best advantage, with his work always planned in advance, so that they know they always have a job ahead of them.

—Richard M. Van Gansbeek, in *American Industries.*

THE PROFIT THAT ARISES FROM DIPPING SHEEP.

The intention of this article is to draw the attention of owners of large and small flocks to the profit to be derived from dipping sheep, irrespective as to their being tick and lice infested, and to the most practical and easiest way of going about it. Some owners object on account of expense, and many more because they don't like work, and others, again, have no liking for sheep beyond the £ s. d. part, and some take to sheep raising with insufficient knowledge of the art of profitable sheep farming.

It would be a good demonstration to exhibit at some of our pastoral shows, say, 50 sheep of the one age, breed, and sex, reared under exactly similar conditions—25 dipped and 25 undipped. A lesser number would do, provided that each lot got the same treatment from start to finish. Let them be weighed before dipping, and also the controls, and at the exhibition let both lots be weighed, say, not less than eight months or so after treatment. From experience I can safely say it would be an eye-opener to the uninitiated, and I will detail as near as I can an experiment of my own:—Fifty two-tooth sheep (cross-breds) were selected out of one flock, all born at the one lambing. These when shorn cut nearly equal weights of wool. Six weeks after shearing they were all weighed, and 25 were dipped and 25 were not dipped. They were all clean sheep, and were then turned out together, and received exactly the same treatment as regards food (natural pasture only) and other attentions right up to the next shearing, when they were shorn and again weighed. The result was the dipped sheep cut 1½ lbs. more wool and had gained 5 lbs. more meat than the undipped ones. These were all wethers, and the season was an average one. Another year, one of semi-drought, another experiment was tried, with the same result, as far as increases in wool and mutton are concerned, but not to the same extent. The increase in the second experiment was ¾ lb. of wool and 3 lbs. of mutton. The wool was tender in both lots, but was more bulky in the dipped. Now, to show that it pays to dip, we will take an owner of 1,500 sheep, as that is getting near what most flocks will number in the very near future. First we will take the cost of putting down a dip, say, £40, though that is outside what it would cost, as *in most districts, if the sheepyards are properly built*, the swims and draining pens can be made to fit in. Now to total up:—Dip, £40; yards, £20; dipping 1,500 sheep, at ½d. per head, £6 5s.; three men's wages, at 1s. per hour (*three hours*), 9s.; makes £66 14s., including everything. Now, on the credit side we find increased weight of wool at 1½ lbs. per sheep, at 8d. per lb., £75; increased growth of meat, 5 lbs., at 6d. per lb., present price, on 1,500 sheep, £187 10s.; total, £262 10s. Deducting cost of dipping and appliances, £66 14s., leaves £195 16s., or about 2s. 7¼d. per head profit. After the first year the profit is greater, as we only have to allow about 10 per cent. for depreciation, &c.; but there is still another tangible gain, and that is in the selling value, easily 1s. per head, because dipped sheep are more presentable to the buyer. The increase in mutton only takes place during the sheep's

maturing years, say, from lambhood to about 6-tooth off. Aged sheep keep in better condition both in flesh and wool. At 4 years old the wool growth has reached its "pivotal point," and begins to decline, but during the growing period of the sheep there is a large margin of profit in dipping properly. There is a right and a wrong way to do all things. I don't intend the figures given to be absolutely correct, as the profit would vary in different districts; but, no matter where or when, there is a good profit. What I want to show is that as a business transaction dipping pays handsomely. I know one man who usually dealt in crossbred weaners off shears, and as soon as they arrived on his holding they were thoroughly dipped, not for vermin, as they were perfectly clean in this respect, but to free them from all troubles as much as possible, so that all they had to do was to eat and grow. That man always sold at large profits, and his sheep always took the buyer's eye.

Many years ago in a dry time I had to shepherd a flock of sheep, and as usual under these circumstances, one becomes a philosopher, being alone from daylight to dark. Now, that flock was thickly infested with ticks, and in order to occupy my mind I used to see how much feeding time the sheep lost nibbling and scratching, and I found that certain sheep that I knew well by their countenances lost from three to four hours each day from rest and feed by having to rub and scratch themselves to allay the irritation set up by the ticks biting. Now, I came to the safe conclusion during the two months I had charge of that flock, that they were diverted from increasing their productive value, such as growing wool and carcass, for fifteen days. That would be roughly 2 ozs. of wool and about ¼ lb. of flesh, fat, and bone. The owner of, say, 1,500, loses 2s. per head in the young sheep; that amounts to £150, and he is like unto the man in Scripture who only received two talents.

Dipping with a good dip tightens up the tip of the wool, thus preventing dust and rain penetrating too far down the fibre.

Many owners of sheep not vermin-infested look upon the dipping as unnecessary and non-paying; but I know that it is a profitable investment, is also a disinfectant, and a deterrent of the fly. It does not entirely prevent flyblows, but it goes a very long way towards doing so. If the sheep are well-crutched as well, there will be only a small percentage attacked.

I prefer a dip that has sulphur in the make-up, because the sulphur hangs on better than carbolised dips, which are more volatile, and in our dry, hot country the deterrent effect evaporates.

Of course, there is an art in dipping sheep, which is soon learned by use and observation. For instance, keep the dip up to a uniform strength and also keep it well stirred, so as not to waste the stuff, and also see that all sheep get a proper soaking, especially under the jaws, as it is here that tick-eggs find a secure lodgment. Some owners are extremely careless, and they blame the dip if the results are not what they expect. But dipping returns a good profit all the same.

Many owners credit dipping with only an increase in wool at a quarter of a pound, but this is too little. From three-quarters to over a

pound is about the increase, according to the season. I have proved this by actual weighing. A dip in itself does not directly influence a better growth, but it does indirectly by promoting a healthy skin, and by freeing the animal from annoyances that have a debilitating effect. It won't make wool grow where it is deficient on a sheep, but it will make the woolly parts grow more wool than on a similar sheep undipped, and this extra growth of carcass and wool leaves a profit sufficiently large to compensate the owner for all the extra work undertaken. Small owners of from 100 to 200 sheep do not want so large a plant; for these numbers dips can be built to suit their requirements very cheaply, and if it is done on co-operative lines, like shearing, one individual would not feel the cost, which should not exceed, after the dip is constructed, 10s., and the profit would be £3 to £4 in money value, that is for very small lots above-mentioned, where they have to be driven 4 or 5 miles. Spraying the dip on to the sheep is not effective in ridding it of vermin, because you cannot get it into all the crevices, as it were, and the sheep have to be up-ended to get at the belly parts. The swim is the only effective way, the sheep being entirely immersed at least once during the swim. The swim does not require to be longer than about 20 feet, provided the sheep are allowed to remain in the right time, and if the right medium is used at the right strength. It is the dip that tells. It is always as well to test the strength by using it on two or three sheep before the general dipping takes place. Seven to eight hundred sheep an hour is fair work.

"Crowfoot."—*The Pastoral Review*, November, 1915.

ENSILAGE—ITS VALUE AND COST OF PRODUCTION.

By R. R. Kerr, Dairy Supervisor, Research Farm, Werribee.

In successful dairy practice, from a productive and economic standpoint, the feeding of the dairy cattle is the farmer's chief concern, and it needs very little experience to convince any intelligent farmer that any lack of attention or thought on this important subject will soon be shown by a decreasing yield of the cows and a falling off in condition. Again, experience proves that one must expect a small yield the succeeding lactation period.

For any certainty of profitable result these feeding operations must be planned many months in advance, because no man has any certain idea of what Providence holds in store in the shape of rainless periods, floods, pests, and unforeseen contingencies. These hard times are experienced in all countries, and are apparently a reminder against carelessness, and perhaps necessary for the proper working of the universe. In the present season abundant crops and pastures abound in the many districts of the State, and it behoves us to make the best use of our opportunity and make provision for the lean times that surely come every few years.

One of the cheapest methods of conserving any green fodder is to convert it into silage, as, if properly made, it means having succulent fodder at all times, and a more healthy animal as a result of its feeding in the dry months. An all too common excuse for not making silage is —too costly—too much work; both erroneous expressions in practice, as it is, practically speaking, the cheapest feed in a bulky form that one can obtain.

The work of filling seems to prey on the minds of many men, all forgetful of the fact that to obtain a similar result would entail the continual growing and cutting of green crops in all weathers and every day in the year.

In the case of the farmer, what is meant for caution, so often proves quite the reverse, and is actually extravagance, seeing that it costs him in the long run more than he can afford to lose. That the hesitation so common amongst farmers to incur even highly remunerative expenditure can be departed from, was shown recently, when herds had to be replaced. But, unfortunately, it was to meet misfortune rather than future needs. One farmer expressed an opinion current among many of them. He said that "For farmers to incur the outlay is all very fine for Government experts to talk glibly about. Building a silo and making silage costs money and means a lot of work." Farmers holding just such opinions came before the various Boards, which sat to consider applications for cattle advances, &c. Most of them assured the Board that they could easily meet an advance of £250 if the Government would only advance the sum. When the herd was intact they would not lay out the small sum in a silo which would have saved their cows, but they were quite prepared to incur a new liability of perhaps five times the sum, and depend on a new untried herd, not yet acquired to meet it.

The past drought accounted for the death of many of our cattle, and the good crops and pastures this year, with the scarcity of cattle, must result in a low price for hay, and it is hoped that more use will be made of the silo. Silage will keep indefinitely, and does not suffer from vermin. Pastures have a very low feeding value after being continually bleached by the elements, and when rain comes after a dry spell, they rot and blow away.

The future prosperity of our dairying industry depends on the economic production of our milk and butter. Many of our old ideas must be thrown into the melting pot, and force of circumstances demands constant progress. With that in the foreground, our needs will force more attention to the production of silage. We all admire the progressive business methods of the American farmers, and their success is greatly due to the use they make of the silo—many thousands are in continual use: in fact, no farm is deemed complete without one. The object of this article is not so much concerned with the making of silage, but to give a concrete example of the great benefit derived from it by a farmer in the Boisdale district.

Mr. Trevor Harvey has a farm on the closer settlement portion of the Boisdale Estate, and owing to the uncertainty of the seasons, he decided to erect a silo, under the conditions offered by the Department of Agriculture.

If all the dairymen of the State were imbued with the same spirit of intelligent enterprise, failures would be few. Mr. Harvey is proving that success is assured where sound business methods prevail, and in his own words states that any dairyman who fails to make use of silage is ignorant of the best methods of farming practice. He could not correctly estimate its value to him during the past year, as the cows milked well during the drought, and he gained the high prices ruling for milk and butter during the winter months, and through the silo he was in a position to sell £200 worth of chaff. He kept his herd intact and sold £100 worth of cattle. Incidentally I may mention that Mr. Harvey is establishing a pure Jersey stud, which he has entered in the Government Pure Herd Testing scheme, and, judging by his adoption of sound methods and the enthusiasm he displays, his success is certain. The silo is of 70 tons capacity, of the wood and iron pattern. The crop harvested was maize, which did not cob, owing to the very hot winds at flowering time, and was dying off when it became necessary to cut it and commence filling the silo. There was very little waste, as it was good right up to the iron—except at the joints. Any waste was spread on the ground for the dry cattle, where it was cleaned up. The silage was sweet, of very appetising smell, and with good colour and appearance. The cows were given 30 lbs. each daily, with a little bran.

Cost of Production.

The land occupied by the maize (9 acres) was previously sown with oats for hay, which was a failure owing to the dry season. After the rains the land was at once ploughed, and the maize sown about the 20th December, the cutting was commenced on the 25th March, the maize occupying the land for three months, and immediately after removal the land was ploughed and sown with oats for grazing purposes.

Mr. Harvey supplies the following figures as the cost of production and other charges.

	£	s.	d.
9 acres of land, at £26 per acre, for three months, at 5 per cent.	2	18	6
9 acres, ploughing, at 8s. per acre	3	12	0
9 acres, two strokes of harrow, at 1s. per acre ..	0	18	0
9 acres, rolling, at 1s. 6d. per acre	0	13	6
9 acres, sowing, at 2s. 6d. per acre	1	2	6
2 bushels of seed, at 5s. per bushel	0	10	0
3 times cultivation, at 3s. 6d. per acre	4	14	6
Harvesting, carting, and filling silo, labour, cutter, and engine hired	11	11	6
Total .. .	£26	0	6

Thus we see that the approximate cost of the silage was 7s. 6d. per ton, and this includes 3s. 4d. per ton for harvesting, carting, and filling

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The acreage of land under fallow in 1898 was 399,535 acres. This increased to 1,738,572 acres in 1914, but showed a decrease of approximately 400,000 acres in 1915.—*Victorian Year-Book* 1914-15.

Last year in Victoria the number of farmers who used artificial manure was 31,871, as compared with 21,586 in 1905, and 7,318 in 1898.

The area on which artificial manure was used represented only 7 per cent. of that under crop in 1898, but since then the proportion manured has rapidly increased. In 1901 it was 19 per cent.; in 1903, 36 per cent.; in 1905, 56 per cent.; in 1909, 66 per cent.; in 1911-12, 74 per cent.; in 1913, 77 per cent.; and in 1914, 81 per cent.

Only 19 acres in every 100 under crop in 1901 was treated with artificial fertilizer, but last year the acreage fertilized was 81 acres in every 100 cropped.

The number of tons of artificial fertilizer, at least 85 per cent. of which would be superphosphate, used in Victoria in 1901 was 23,526 tons against 117,935 tons in 1914—truly a remarkable increase over the short period of thirteen years.

The average dressing per acre in 1901 was approximately 94 lbs. against 70 lbs. in 1914.

Approximately 25 per cent. of the fertilizer used was imported, the remainder being the product of Victorian industry. *Victorian Year-Book*, 1914-15.

Paint for Outbuildings.—A correspondent asks for a recipe for a cheap, durable paint for outbuildings. Mr. D. Oliver, Foreman Painter Public Works Department, Wellington, to whom the matter was referred, states that if the colour does not matter the following is about as cheap and durable a paint as it is possible to make up: To 5 gallons of boiled oil add 1 cwt. oxide of iron; let soak twenty-four hours; add 15 lbs. patent driers and 2 gallons kerosene, and mix well together. The colour of this paint is dull red.—*Journal of Agriculture, New Zealand.*

FARMERS' FIELD DAY.

WYUNA STATE FARM.

Abridged from the "Kyabram Free Press."

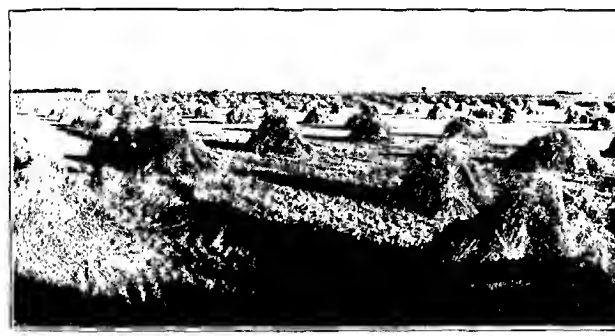
About 100 farmers and visitors assembled at the State Farm, Wyuna, on Friday, 26th November, when a farmers' field day was held. Mr. A. E. V. Richardson, Agricultural Superintendent, with Mr. Baird, the farm manager, conducted the visitors in a tour of inspection of the crops, stock, poultry, and experimental plots.

At the outset Mr. Richardson addressed the gathering in the implement shed, and read apologies from the Minister for Agriculture, Mr. Hagelthorn, Mr. H. McKenzie, Minister of Railways, and the Director of Agriculture, Dr. Cameron, all of whom were unavoidably prevented from attending owing to an important meeting of the State Wheat Marketing Committee.

Cutting Crop for Silage, Wyuna State Farm.

Mr. Richardson, in welcoming the farmers, said they had to congratulate themselves on the prospects for the coming harvest, which were a pleasant contrast to the drought conditions of last year, which had not been worse in Southern Australia within living memory. Reliable authorities estimated that 25,000,000 sheep and 2,500,000 cattle, with thousands of valuable horses, had perished as a result of the drought. The terrible experience of last year made many farmers vow that they would not be caught napping again, but they would lay by stores of fodder in good seasons, when there was a surplus, and hence large stacks of hay were accumulating on every farm. Many farmers, owing to scarcity of stock and abundance of feed were ensiling quantities of green feed, *both in overground and underground pits*, and even in

roughly prepared excavations. Such provident activity was to be commended, and the farmers would be rewarded in the first dry season they experienced. On the Wyuna farm the germ of prudential activity was abroad, and already 270 tons of chaffed ensilage had been made, 220 tons of hay cut, and the wheat and oat crop which would be thrashed would yield over 200 tons of straw—and this apart from the hay from the lucerne area. Besides drawing attention to the necessity for building up hay reserves, the drought had also led the community to conserve its water resources. At Sugarloaf operations had already commenced, and the reservoir being constructed there would have a storage capacity of 330,000 acre-feet of water. Waranga Basin was being extended to impound 320,000 acre feet, and in addition other storages were contemplated under the Murray Waters Agreement, and it was anticipated that eventually there would be more than enough water to irrigate 700,000 acres of land in these Northern districts. Finally, the drought caused an almost total failure of the crop last year, but the Government, in spite of the many difficulties confronting



View of Oaten Hay Crop, Wyuna State Farm.

the farmer, appealed to wheat-growers to sow a record acreage this year in view of the likelihood of a good season after the drought and the certainty of good prices for wheat in the markets of the world. The farmers responded magnificently in spite of the shortage of feed, and scarcity of seed wheat and the losses of farm stock. They were aided by an advance of £600,000 made by the Government, and as a result 4,100,000 acres of wheat had been sown, *i.e.*, 35 per cent. more wheat than the highest previous records. Very favorable conditions for wheat had prevailed this season, and it was anticipated that Australia's total crop would exceed 150,000,000 bushels, thus giving a surplus of 120,000,000 bushels, double the amount available for export in an ordinary year. At the same time it was extremely difficult to secure freight owing to the total disappearance of the German mercantile marine from the high seas, and the commandeering of British ships for the transport of men, munitions, and foodstuffs.

Mr. Richardson reviewed the work done in the field and poultry yards, and subsequently visitors inspected the farm.

He said that this year 280 acres had been sown with cereals, including 120 acres of wheat, 80 acres of hay, 10 acres of silage mixture, 35 acres of barley, 5 acres of rye for grain. The 40 acres cut for ensilage gave 270 tons of green stuff. All this had been chaffed into three overground silos, and was intended for winter feeding of the dairy stock. Three different methods of covering the silage were being tried, and the relative efficiency of these methods in preventing waste should prove of interest.

The wheat plots comprised manurial tests, rate of seeding, early and late sowing tests, and variety wheat trials. Fifteen different manurial tests were being conducted with varying combinations of manures. Some plots were unmanured; some had been dressed with phosphatic manures applied in different forms, and at varying rates per acre, while some of the plots were limed, and others treated with nitrogenous and potassic manures. The comparative merits of each system

View of Poultry Pens, Wyuna State Farm.

of manuring would be shown on harvesting, and would indicate the needs of plain land with regard to artificial manures.

Referring to the poultry section, the development of which was a feature of the farm, Mr. Richardson stated the Department was endeavouring to provide a good supply of high class egg-laying strains of White Leghorn. There were at present 1,300 pedigreed Leghorns, all bred from prize winners at the Government egg-laying competition. Orders for eggs had been received from every State in the Commonwealth during the past year. The world's record for egg-laying had been established last year at Burnley, when six hens, the progeny of a setting of eggs from Wyuna had laid 1,699 eggs. The cardinal principles in poultry-keeping were breeding, feeding, and weeding. Keep only good laying strains, feed them liberally and well, and cull out severely the inferior birds.

An inspection of the poultry yards and plant was made under the guidance of Mr. W. C. Rugg, the poultry manager. One of the first

features observed was a system of trap nests, installed for the purpose of detecting the best layers in a pen, and to demonstrate the different cycles in egg-laying peculiar to particular hens. Poor layers are discovered and cast out, and this method corresponded to a system of herd testing employed in a dairy herd. Some pens of fine pedigreed birds were on view, including many from this season's hatch. The gathering had an opportunity of comparing the pen system with the flock system. This latter system is coming into vogue. The many devices used in feeding, watering, &c., showed how a large flock may be managed with an economy of labour. Mr. Rugg stated that in his opinion a settler could, with the flock system, look after 500 birds, and do his ordinary work of dairying besides, and if he confined himself to poultry farming he could handle 2,000 birds a year. The incubator room and brooder house were examined, and proved of considerable interest.

Leaving the poultry yards, the visitors were shown small areas of lucerne and artificial pastures, which had been sown for green feed.

Breeding Pens, Wyuna State Farm.

An enclosure of movable hurdles enables Mr. Rugg to hut a flock of young chickens on different parts of the areas.

The next feature of interest was the pasture top-dressing experiment. This series consisted of four ½-acre plots which had been treated with super. alone, with super. and lime, and with basic slag, while one plot was left untreated as a check plot. Although the land had been given no special treatment besides the top-dressing, the response to the fertilizer was most apparent, and the remarkable feature was the different character of the pasture on the four plots. The two plots which have been treated with lime and basic slag respectively showed a dense growth of trefoil and clover. It was stated that when stock were allowed to graze on the area they showed a preference for the pasture on the treated plots. The improvement effected caused great comment.

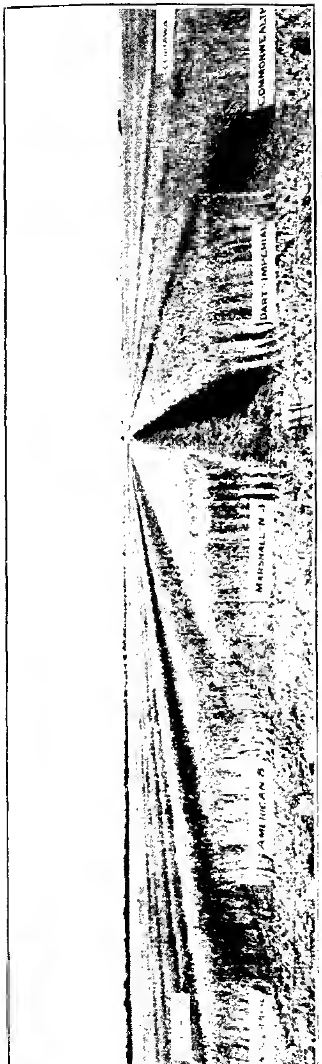
The manurial tests on wheat were of interest. There seemed to be an increased growth corresponding to the amount of super. applied, but the efficiency of basic slag and bonedust as phosphatic manures was

not so marked. One plot was treated with sulphate of potash in addition to super., and another with sulphates of ammonia and potash as well. No marked difference could be noticed between these plots, and an adjoining one to which super. alone had been applied. In a season like this the nitrifying organisms in the soil are very vigorous, particularly in well-worked fallows, and nitrogenous manures have little effect on the crop. Liming did not appear to have influenced the grain yield, but it promoted a dense growth of straw. No conclusive evidence of the relative value of these different manures will be available till these plots are harvested.

In the variety wheat trials a number of different wheat were growing side by side to compare their progress under our conditions. They included Federation, Yandilla King, Marshall's, Dart's, Imperial, Commonwealth, Currawa, Bayah, Penny, Gluyas, King's Early, College Eclipse, American 8. All these wheat looked well, Penny being pro-

View of Brooder House and Laying Shed (Open Shed System), Wyuna State Farm.

minent. This wheat, it was stated, has given good results in departmental trials. It has a nice head, with plump grain. Other varieties attracting attention were Currawa and Dart's Imperial, and these looked very well in the bulk plots also. This latter wheat shows a fine growth of straw, with well filled heads. Other bulk plots included Commonwealth Yandilla King, and there was to be seen a particularly fine bulk crop of Federation, very level and uniform, and free from foreign heads. Two varieties pointed out as suitable for late sowing were Gluyas and King's Early, which are early maturing wheats, grown in large quantities in South Australia and the Victorian Mallee. The rate of seeding and early and late sowing tests occupied twelve plots. All had similar amounts of manure, but six were sown at the end of April, and six in the middle of June, at the rates of 30, 45, 60, 75, 90, and 120 lbs. per acre. The amount of grain harvested from each plot will be an index to the most profitable rate of sowing. One



View of Experimental Wheat Plots, showing rate of seeding and time of sowing trials, Wyuna State Farm.

View of Selected Seed Plots, Wyuna State Farm. The plots are sown from selected heads, and the produce of these plots are sown in "variety" and "bulk" plots, to provide seed for distribution amongst farmers.

of the facts, which was clear, was that for later sowing it is advisable to increase the rate of seeding, as late sown wheat does not tiller so well.

The wheat, barley, and rye crops are being cut for thrashing. Cape barley has done exceedingly well this season, and 35 acres of barley was to be seen stacked. Mr. Baird, Farm Manager, estimates a return of over 40 bushels to the acre.

The draught mares with their foals were inspected, and later the dairy herd. Most of these are pure bred Jerseys, those at present being milked are of high quality.

View of Bulk Wheat Plots, Wyuna State Farm.

Fifteen acres of new lucerne had been sown on subsoiled land. Tamworth lucerne was sown with a mixture of basic slag, ¾ cwt., and superphosphate ¾ cwt. per acre. The effect of the subsoiling will be interesting. Experimental plots of summer crops, including ten varieties of maize, five of millet, and five sorghums are being grown to test whether they are suitable for local conditions. Lucerne manurial tests are also being conducted, including liming, treatment with basic slag, gypsum, &c. Great credit is due to Mr. Baird for the uniformly heavy returns obtained this year.

A NEW VARIETY OF HOPS.

"The Foundling."—This describes a new variety of hops found at Wye College. It has been thoroughly tested since 1908, and is noted as having good cropping qualities, high resin content, marked resistance to, if not total immunity from, the "nettle-head" disease; and lateness of season.

—E. S. Salmon, *Journal, Board of Agriculture (London)*, 1915.

POTATO EXPERIMENTAL FIELDS, 1915-16.

By A. T. Ramsay, Potato Expert.

Experiments in the cultivation of potatoes are being continued this season at Leongatha, Koo-wee-rup, and Portland. The areas on which the work is being carried on were chosen, firstly, because the soils were suited to potato production; and, secondly, because they are typical of large areas of land within the State, so that the results obtained will be widely applicable.

The accompanying plans show the details of the experiments and demonstrations.

Leongatha.

At Leongatha 5½ acres in all have been planted, which have been divided into sections as follows:—Section 1 is designed to test the effectiveness of eleven different manurial treatments, ranging from a moderate dressing of 3 cwt. of superphosphate per acre to 15 cwt. per acre of a compound, comprised of phosphatic, potassic, and nitrogenous manures, in order that the most profitable mixture and rate per acre may be determined. On this section thus treated, manurially, there have been planted ripe and immature seed of three different varieties suited to the district, namely, Factors, Sutton's Abundance, and Up-to-Date. All of these did fairly well in the district last year in spite of the dry season.

Section 2 is given to testing the efficiency as a preventive of disease of the use of dipping and spraying solutions. The portions of this section are seeded with potatoes which were (*a*) dipped straight away when dug last April; (*b*) dipped in November, just before planting; and (*c*) not treated with dipping solution. Fractions of each of these will be sprayed during the growing period, so that at the end of the season the results obtainable will range from seed which was absolutely untreated, as far as disease prevention is concerned, to that which was dipped only, sprayed only, and thence to plots which were as fully guarded from disease as is practicable by dipping and spraying treatments. The dipping solution used was made from corrosive sublimate at the rate of 1 oz. to 6 gallons of water, and seed treated with this solution was immersed for two hours, and then thoroughly drained and dried before planting. Spraying during the season will be done with a solution of copper and soda mixed in the proportions of 2 lbs. copper sulphate and 2½ lbs. washing soda to 10 gallons of water.

Section 3 is devoted to testing the best depth at which to plant sets, a question which is the cause of much argument at the present time amongst growers, because of the differences of opinion held on the matter. On this section the tubers have been uniformly spaced in the rows at 18 inches apart, while the depths at which tests are being made are 3 inches, 4 inches, 5 inches, 6 inches, 7 inches, and 8 inches.

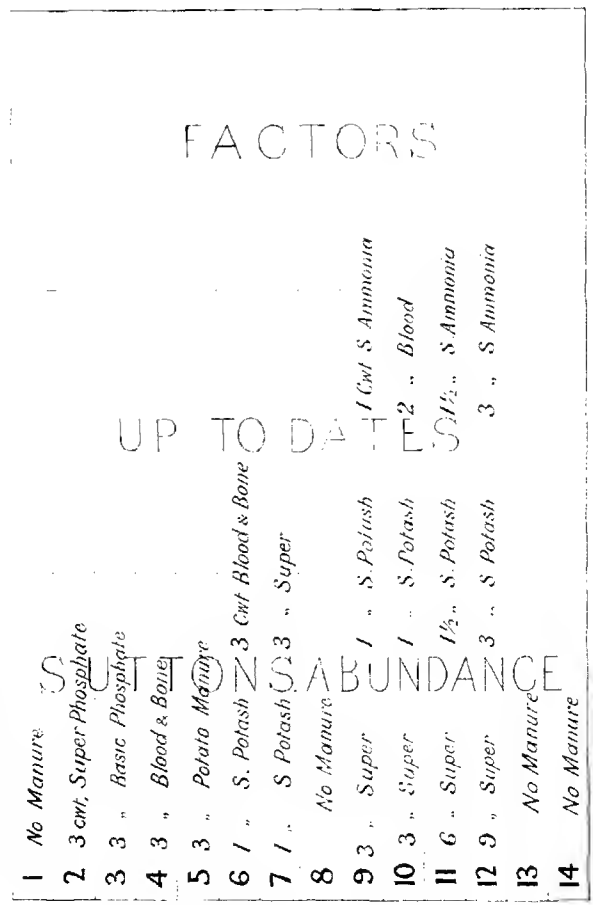
Section 4 is carried out to determine the most economical spacing at which tubers should be set, and planting has been done at 12 inches, 15 inches, 18 inches, and 21 inches, while the depth of planting has been kept uniformly at 4½ inches.

Section 5 will give a demonstration of the value of immature seed, as compared with ripe seed, and is one of the most important sections, if any distinction can be justly made. Six varieties are being used, these being Sutton's, Factors, Carman, Early Norther, Black Prince,

POTATO EXPERIMENTAL PLOTS

LABOR COLONY

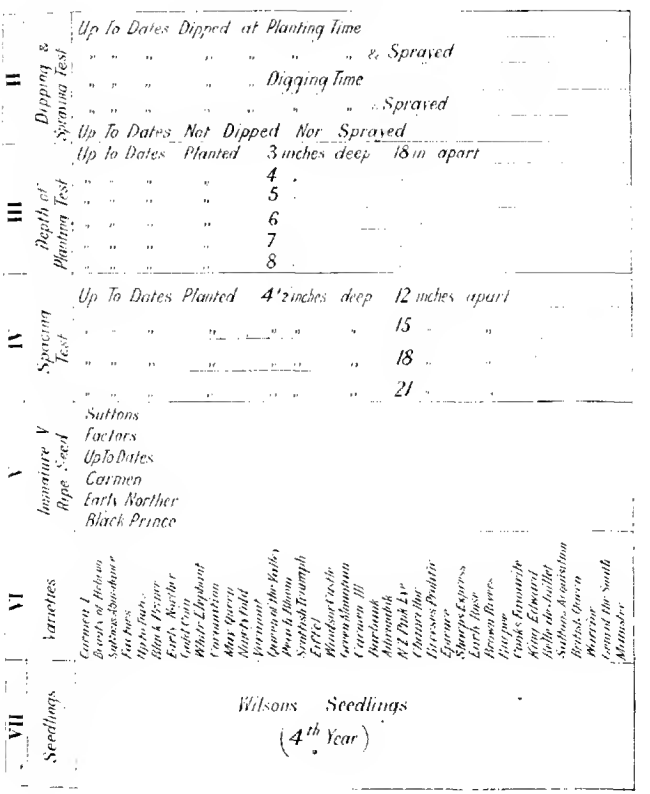
LEONGATHA



POTATO EXPERIMENTAL PLOTS

LABOR COLONY

LEONGATHA



and Up-to-Date. Immature seed of each of these varieties was secured out of the growing crop at Leongatha last year, while the ripe seed of each was dug out of the same crops after ripening.

Section 6 has been planted with thirty-eight different varieties, most of which are commonly cultivated in the State, in order that these may be compared in prolificacy, quality, &c., the one against the other. Data will be collected from this section as to the habits and period of maturation of each variety, for the purpose of classification. All of the seed used in this test was saved from the crop at Leongatha last year.

Section 7 is given over to the further testing of the new varieties raised by this Department from seed supplied by Dr. Wilson, of St. Andrew's University, Scotland, and is now being grown for the fourth year. Last year over 130 of these seedlings were planted, out of which about thirty have been retained for this season's trial. From these it is confidently expected that some new varieties may be produced which will be worthy of inclusion amongst the varieties grown commercially in Victoria. Planting at Leongatha was finished on 18th November, 1915, the lateness of the spring having retarded the preparatory cultivation work. Though the crop is scarcely midway through the season at the time of writing, there is a marked difference in the portions differently treated as regards manures and seed control, the most notable being (*a*) in favour of immature seed as against ripe seed; and (*b*) the promise of greater yields given by the heavier dressings of manure in proportion of the weight of these dressings.

An interesting fact in regard to the section on which depth of planting tests are being conducted is that the planting (8 inches) at the end of the first six weeks compared but poorly against the shallower depths of planting, while the improvement was steadily progressive from the 8-inch depth to the shallowest depth.

ANALYSIS OF LEONGATHA SOIL.

Parts per 100,000.

	Soil.	Subsoil.	For comparison, a good soil should contain -
Nitrogen	157	87	150
Phos. Acid	45	70	150
Potash	58	35	250
Lime	136	204	500
Magnesia	112	84	Not more than lime
Chlorine	14	12	Not more than 35
Reaction	Acid	Acid	Neutral to slightly alkaline

KOO-WEE-RUP.

At Koo-wee-rup, 2 acres have been given to experimental work, and this area has been divided into twenty sections, seventeen of which have been treated differently with regard to manuring, the details of which may be seen on the plan. In designing this experiment, it was decided that the majority of the plots would be treated with manures, costing approximately 21s. per acre, the exceptions to this being the heavier

KOOWEERUP

EXPERIMENTAL AREA, 2 ACRES POTATOES

CENTRE ROAD

1	Check
2	Lime 1 Ton, Super 5 cwt.
3	Blood & Bone 5 cwt. S. Potash 1½cwt.
4	Lime 1 Ton, Super 2 cwt. S. Ammonia ½ cwt. S. Potash ½ cwt
5	S Potash 1½ cwt
6	Check
7	Super 4½ cwt.
8	Blood 3½ cwt.
9	Super 3 cwt Blood 1 cwt
10	Bone & Super 4 cwt.
11	Check
12	Potato Manure 3 cwt.
13	Blood & Bone 2 cwt. S. Potash ½ cwt.
14	Basic Phos. 3 cwt. Blood ¾ cwt. S. Potash ½ cwt.
15	S Ammonia 1¼ cwt.
16	Super 3 cwt. S. Ammonia ½ cwt.
17	Basic Phosphate 5 cwt.
18	Blood & Bone 3 cwt.
19	Super 3 cwt. S. Ammonia ¼ cwt S. Potash ¼ cwt.
20	Check

Four Rows this (W.) Side manured with 4 Cwt Super extra.

dressings of blood and bone with sulphate of potash, and the plot dressed with lime. The varieties planted here comprise Cook's Favourite, Adirondak, Manistee, and Carman No. 1 and immature and ripe Factors. This area was planted on 20th October, 1915, and on the date of the last inspection the heavier rates of manuring were showing the best growth. In addition to the variety and manure tests at Koo-wee-rup, an interesting trial is being made between sets having weak buds or sprouts, and sets which develop normally strong sprouts; both of these classes of seed being planted on all the varied manurings.

ANALYSIS OF KOO-WEE-RUP SOIL.

Parts per 100,000.

	Soil.	Subsoil.
Nitrogen	398	141
Phos. Acid	96	57
Potash	75	61
Lime	60	138
Magnesia	145	117
Chlorine	20	12
Reaction	Acid	Acid

CASHMORE HEATH, PORTLAND.

On the heath country at Cashmore, the potato experiments are being carried out on two classes of soil. One is a grey sandy soil, locally described as "flat" land, and the other is a black, sandy soil, very full of fibre, which is commonly termed "hill" land by the residents of Cashmore Heath. The grey soil is responsive to manures, and yields fairly good crops, but on the hill soil the farmers of the district have, so far, been unable to obtain payable results with any crop, though, as may be seen by comparison of the analyses of the two soils, the difference in their chemical contents is not extreme.

ANALYSIS OF CASHMORE HEATH "FLAT LAND."

Parts per 100,000.

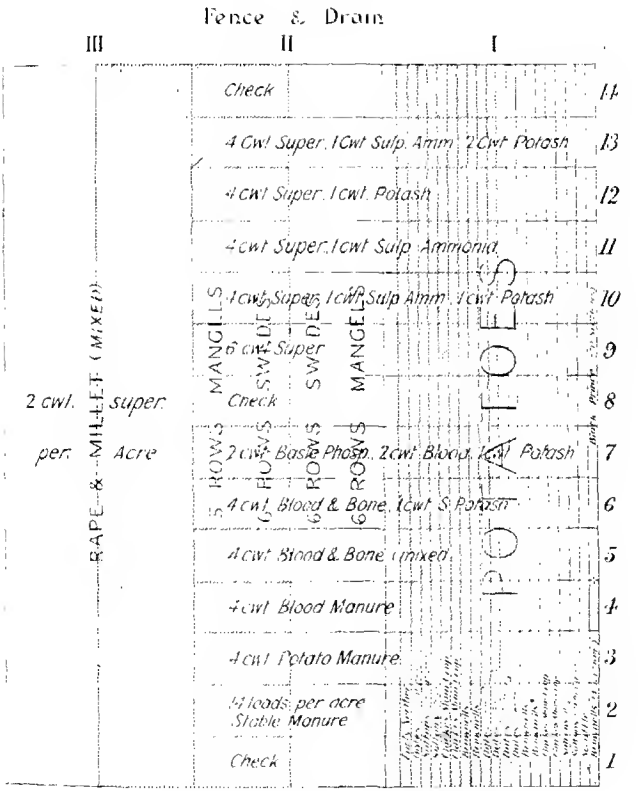
	Soil.	Subsoil.
Nitrogen	109	35
Phos. Acid	13	10
Potash	17	17
Lime	122	54
Magnesia	99	67
Chlorine	8	8
Reaction	Acid	Acid

The scheme of manuring as done at Cashmore differs from those at Koo-wee-rup and Leongatha, inasmuch as the effect of liming the soil with 1 ton of agricultural lime per acre has been tried with all manures.

Potato Experiments on Flat Land

Cashmore, Portland

Area, 1½ Acres.



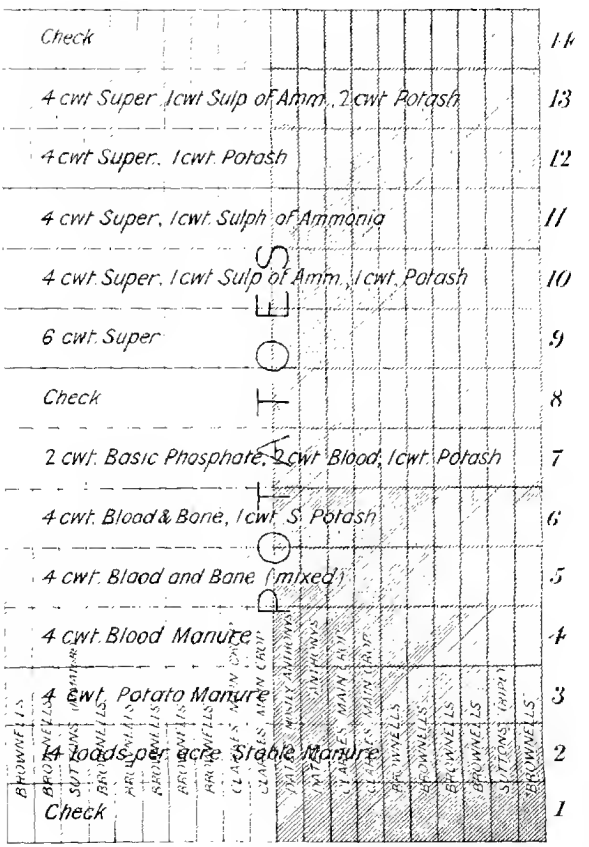
Portions shaded diagonally Lined.

Potato Experiments on Hill Land

CASHMORE, PORTLAND

AREA, ½ ACRE

IV



Portions shaded diagonally lined

The manuring here has twelve variations on the limed and the unlimed portions, making twenty-four variations in all, in which potatoes, mangels, and Swedish turnips are being grown. The varieties of potatoes being tested are immature and ripe Sutton's Abundance, ex Leongatha, Brownell's Beauty, Dates, Clark's Main Crop, Early Norther, and Scruffle, all of which are suitable to the soils of the district. The manuring tests on the hill and flat lands are the same, and the plots were planted on 29th November, 1915.

Analysis of Cashmore Heath "Hill Land."

Parts per 100,000.

	Soil.	Sub-soil.
Nitrogen	118	72
Phos. Acid	11	8
Potash	16	9
Lime	82	62
Magnesia	86	66
Chlorine	8	8
Reaction	Acid	Acid

Remarks.

The whole of these test plots have been designed with the object of securing definite information as to the most profitable procedure in potato cultivation, that is, the procedure which will most economically produce the greatest production per acre. The manures in every case were broadcasted by hand prior to planting. At Portland the potatoes were ploughed into the ground, but at Leongatha and Koo-wee-rup planting was done by one of the greatest labour savers in all the collection of farm implements, namely, the potato planter, one of the machines which has done much to lessen the troubles of the potato grower in the matter of labour.

The climatic conditions since planting time to date have not been favorable to the potato crop. A late cold spring which retarded planting was followed by a spell of dry weather which has, since 1st December, had no breaks of weather of sufficient consequence to materially assist the crop; but the season is young yet, and much may happen.

The interest taken in the experiments carried out last year was gratifying, and it is hoped that this interest may be more than maintained this year, as this season's results should be of considerably greater value than those of the first year, inasmuch as it is expected that they will, in the majority of cases, confirm the findings of last season.

The plots are at all times open to inspection by farmers and others interested throughout the growing period.

At the Labour Colony, Leongatha, the principal of these experimental stations, the work incidental to these tests which this Department is carrying out has been ably and willingly assisted by the manager, Mr. J. J. Willoughby. At Koo-wee-rup, the Department has been granted the use of land on the farm of Mr. John Wadsley, of the Five Mile Drain, one of the pioneers of the district; while at Cashmore, Portland, Mr. G. A. Taylor, an enthusiastic grower, has been good enough to devote portion of his land to this experimental work.

GOLDEN WHEAT.

VICTORIA'S RECORD HARVEST.

Worth over £12,000,000.

The practical assurance that the Victorian farmers would reap the benefit of the record harvest and an exhortation to them to prepare to surpass next season the achievement of this formed the subject of a statement from the Minister of Agriculture yesterday. Mr. Hagelthorn said:—

"The gathering of the 1915 harvest is now practically completed, and it is fairly certain that the yield will considerably exceed 50,000,000 bushels and easily establish a new record. The acreage sown to wheat (4,000,000 acres) represented an increase of over 35 per cent. over the previous highest record, and the aggregate yield will probably prove to be 50 per cent. greater. This result is due to the favorable season, to the energy and enterprise shown by the farmers, and to the financial assistance given by the State Government. The farmers have responded magnificently to the appeal for an increased acreage made twelve months ago. In view of the many difficulties confronting farmers - the scarcity and high price of fodder, shortage of stock and lack of funds owing to the failure of the crop through drought—the response of the wheat-growers is extremely gratifying.

"At one time it was thought that low prices must be taken for our surplus wheat, in view of the scarcity of freight; but, owing to the operation of the wheat scheme, satisfactory prices are being obtained, not only for the surplus exported overseas, but also for the wheat used for home consumption. Thanks to the assistance of the British Government, the Wheat Commission hopes to market the great bulk of the Australian crop before the end of the year. If the present prices of wheat be maintained, Victoria's crop will be worth over £12,000,000, and the exported surplus will bring in over £10,000,000. Such an addition to our income will be very welcome, and, incidentally, it indicates the importance of developing the agricultural resources of the State. As much as 200,000 tons of flour will be exported from Australia during the next two months to feed our allies, and no doubt other orders will follow in due course. Every bag of wheat that can be raised within the Empire means a bag less to be imported from foreign countries, and the Allies are in need of all the surplus of Australia, Canada, and India to satisfy their requirements.

"The harvest of 1915 is now over, and preparations for the crop of 1916 must now be made. I have no doubt that the wheat-growers will spare no effort again to cultivate as large an acreage of crop as possible, and to cultivate it well. The general rain experienced during the last twenty-four hours will enable farmers to cultivate their fallows, and lay the foundations for a good crop during the next season; it will also enable a large area of land to be worked up for the coming year. It has been shown that every inch of rain that fell over the wheat-growing areas during the growing period of the crop corre-

sponded to a bushel of wheat per acre over the whole State. By conserving such rains as we have just had by judicious fallowing, the farmer is guaranteeing the success of his future crop.

"The course of the wheat market is always uncertain," the Minister added, "but there is no reason why satisfactory and remunerative prices should not continue. It is therefore to the farmers' own interests to prepare for a large acreage, and to cultivate this acreage with the best possible skill. It is also in the interests of the State to see that he receives adequate encouragement in this work."

—*Age*, 29th January, 1916.

STANDARD TEST COWS.

Quarterly Report for Period ended 31st December, 1915.

During the period 29 cows completed their term under the regulations. Of this number 20 qualified for their certificate.

One new herd was entered for testing, viz.:—

Falkenberg Bros., Colac. (Jersey.)

Individual returns are as follows:-

Mrs. A. BLACK, Noorat. (Jersey.)

Completed since last report, 4. Certificated, 0.

F. CURNICK, Malvern. (Jersey.)

Completed since last report, 1. Certificated, 1.

Name of Cow.	Herd Book No.	Date of Calving.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard of Fat required.	Estimated Weight of Butter.
					lbs.	lbs.		lbs.	lbs.	lbs.
Peerless Pearl	3171	2.2.15	9.2.15	273	17½	5,017	5·27	315·23	260	361½

DEPARTMENT OF AGRICULTURE, Werribee. (Red Poll.)

Completed since last report, 6. Certificated, 3.

Name of Cow.	Herd Book No.	Date of Calving.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard of Fat required.	Estimated Weight of Butter.
					lbs.	lbs.		lbs.	lbs.	lbs.
Cordiboa	Not yet allotted	3.1.15	10.1.15.	27	18	5,518	4·29	236·92	200	270
Aolath	..	15.1.15	22.1.15	27	13	6,189½	4·78	296·05	250	337½
Dalta	..	8.3.15	15.3.15	27	20½	8,110	4·41	355·23	250	382½

GEELONG HARBOUR TRUST, Marshalltown. (Ayrshire.)

Completed since last report, 3. Certificated, 1.

Name of Cow.	Herd Book No.	Date of Calving.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard of Fat required	Estimated Weight of Butter
					lbs.	lbs.		lbs.	lbs.	lbs.
Winnie of Glen Elgin	1850	25.2.15	4.3.15	273	12¼	6,265¼	4·18	262·20	250	209

T. HARVEY, Boisdale. (Jersey.)

Completed since last report, 1. Certificated, 1.

Name of Cow.	Herd Book No.	Date of Calving.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard of Fat required	Estimated Weight of Butter
					lbs.	lbs.		lbs.	lbs.	lbs.
Dainty 6th ...	Not yet allotted	10.1.15	17.1.15	273	19¼	5,306	5·66	300·33	175	342¼

A. W. JONES, Whittington. (Jersey.)

Completed since last report, 1. Certificated, 1.

Name of Cow	Herd Book No.	Date of Calving.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard of Fat required	Estimated Weight of Butter
					lbs.	lbs.		lbs.	lbs.	lbs.
Lady Grey 1st of St. Albans	Not yet allotted	9.3.15	16.3.15	273	17¼	5,255	6·61	347·36	175	396

C. G. KNIGHT, Cobram. (Jersey.)

Completed since last report, 1. Certificated, 1.

Name of Cow.	Herd Book No.	Date of Calving.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard of Fat required	Estimated Weight of Butter
					lbs.	lbs.		lbs.	lbs.	lbs.
Mistletoe of Tarnpirr	2984	23.1.15	30.1.15	273	17	5,282	5·29	279·32	200	318¼

C. G. LYON, Heidelberg. (Jersey.)

Completed since last report, 3. Certificated, 3.

Name of Cow.	Herd Book No.	Date of Calving.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard of Fat required	Estimated Weight of Butter.
					lbs.	lbs.		lbs.	lbs.	lbs.
Silver Audrey	1378	19.1.15	26.1.15	273	6½	5,887	4·85	285·74	250	325½
Silverdale III	715	19.2.15	26.2.15	273	2¾	8,037½	4·08	330·16	250	456¼
Hawthorn of Banyulk	1064	16.3.15	23.3.15	273	21½	7,557½	5·09	385·12	250	439

W. WOODMASON, Malvern. (Jersey.)

Completed since last report, 9. Certificated, 9.

Name of Cow.	Herd Book No.	Date of Calving.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk last Day of Test.	Weight of Milk.	Average Test.	Butter Fat.	Standard of Fat required	Estimated Weight of Butter.
					lbs.	lbs.		lbs.	lbs.	lbs.
Mystery IX. of Melrose	3665	21.1.15	28.1.15	273	24½	7,047½	5·08	421·00	250	408½
Myrtahl II. of Melrose	Not yet allotted	1.2.15	8.2.15	273	18	6,733	5·14	345·36	250	393½
Pearly of Melrose IV.	1421	6.2.15	13.2.15	273	20	5,631½	5·72	322·48	250	367½
Jessie IX. of Melrose	3651	11.2.15	18.2.15	273	22	7,459	5·69	418·62	250	477½
Lassie Fowler III. of Melrose	1137	22.2.15	1.3.15	273	23	8,121	5·40	446·20	250	508½
Zoe V. of Melrose	1496	23.2.15	1.3.15	273	16½	6,159½	6·58	405·26	250	462
Jenny Lind VIII. of Melrose	3651	18.3.15	25.3.15	273	13	6,332	5·47	346·38	250	394½
Rudy V. of Melrose	1414	20.3.15	27.3.15	273	20	8,183½	5·24	429·06	250	489
Mystery VIII. of Melrose	3651	25.3.15	1.4.15	273	15½	6,027	6·14	369·68	250	421½

MOLASSES FOR SOLVING THE POTASH PROBLEM.

A practical try out for a method of obtaining potash fertilizer will soon take place at a New Orleans distillery where molasses is used in large quantities. It is a fact that 106 tons of potash are wasted daily by the 25 or more distilleries in this country subjecting molasses to the processes of fermentation. The New Orleans company is planning to install the process of saving potash in distillery waste recently brought to the attention of the public by the Bureau of Foreign and Domestic Commerce. It should be possible to make fertilizer from this otherwise worthless material at a price that will meet competition even after the war is over.

—Extract from *Pure Products*, Dec., 1915.

BUTTER-FAT IN CHEESE.

By R. T. Archer, Senior Dairy Inspector.

To further demonstrate the equitability of purchasing milk for cheese-making according to its butter-fat contents a number of cheeses has been made by Mr. G. C. Sawers, Departmental Cheese Instructor, from milk containing different percentages of fat, and the results are given below:—

Six cheeses were made each from 500 lbs. of milk, varying in fat contents from 5.4 per cent. to 2.6 per cent. The amount of cheese made varied from 58½ lbs. to 46½ lbs.—a difference of 12 lbs., which, at 6d. per lb., amounts to 6s., or 12s. per 100 gallons, equal to 1.44d. per gallon, practically 1½d. Yet many suppliers to cheese factories in Victoria to-day consider payment at per gallon most satisfactory, though there is such a difference in value for the purpose for which it is bought.

It may be said that this wide variation in quality is unusual. At one factory last season the writer found the variation from 5.4 per cent. to 2.3 per cent. The last sample contained 46 per cent. of added water. Is further comment necessary?

It is not the purpose of this article to enter into the question of whether it is more profitable to make the milk into butter or cheese, but to show that for cheese-making it is just as necessary to pay for the milk according to quality, as it is for butter-making. From the result of the analysis it will be seen that when very rich milk is made into cheese by itself rather more loss of fat in the whey is incurred. This is not so, however, when the milk is pooled and the high test milk mixed with that of a low test.

On the other hand, it will be noticed that cheese from rich milk contains a far higher percentage of fat than that made from poor milk, and the more fat there is in cheese the higher quality it is, and any loss of fat that may occur in rich milk is fully compensated for by the improvement in general quality of the cheese.

The analysis shows that the cheese made from the rich milk contains only 33.54 per cent. of moisture. That from the poorest contains 40.57 per cent. The cheese from the rich contains 40.47 per cent. fat. The cheese from the poor contains 25.46 per cent.

A study of the table will show that each cheese was made from 500 lbs. of milk, varying in fat contents from 5.4 per cent. to 2.6 per cent.

Milk with the highest test, viz., 5.4 per cent. made 58½ lbs. of cheese. Valuing that at 6d. per lb. for convenience gives 29s. 3d., equal to 7d. per gallon.

The milk containing 2.6 per cent. fat made 46½ lbs. of cheese, equal to 23s. 3d., equal to 5½d. per gallon.

The milk testing 3.8 per cent. fat yielded 51½ lbs. cheese, equal to 25s. 9d., equal to 6d. per gallon.

The milk testing 4.7 per cent. gave 56½ lbs. cheese, equal to 28s. 3d., equal to 6¾d. per gallon.

To obtain the different percentages of butter fat cream had to be added or extracted. Normal milk would show greater variation, as

the solids vary, to a large extent, in proportion to the butter fat. The results from normal milk would be still more in favour of milk rich in fat.

Much misapprehension exists with regard to the best and most equitable method of purchasing milk at a cheese factory. Notwithstanding all that has been written and said about the matter, there are many who pretend to believe that the fat contents of the milk is little or no indication as to its value for cheese-making. Much investigation and experiment by leading dairy experts and chemists has been conducted to determine the best method to be adopted, and there is no doubt that the casein test and the fat test combined is the best. Although both these tests are simple, the former as worked out by E. B. Hart and the latter by Dr. Babcock or Dr. Gerber, many directors of cheese factories pretend to think they are too complicated, and desire to adhere to the method of payment abandoned by enlightened and progressive boards over twenty years ago. As the double test, *i.e.*, casein and fat, involves double the work, it is generally conceded that the fat test is sufficiently reliable as a guide to the value of milk for cheese-making and may be adopted with confidence as an equitable basis of payment. That the milk should be paid for according to its cheese-making capacity must be evident to those who do not find it to their interest, probably to cover dishonest practices, to adhere to the system of payment at per gallon irrespective of quality.

In the following table comment on the column "Value of Cheese at 6d. per lb." is necessary. It must be remembered that cheese rich in fat is of better quality and will command a higher price than the lower grade, therefore the difference in value shown in this column will, in actual fact, be greater than indicated.

	Date.	Weight of Milk.	Test.	Fat in Milk.	Value at 1s. per lb.	Cheese from Press.	Value at 6d. per lb.	Value of Milk per Gallon.	Fat in Cheese.	Fat in Cheese.	Fat lost in Manufacture.	Analysis, October, 1914.				
												Moisture.	Fat.	Casein.	Ash.	Salt in Ash.
		lbs.		lbs.	s. d.	lbs.	s. d.	s. d.	%	%	lbs.	%	%	%	%	%
1.	Aug. 4	500	5·4	27	27 0	58½	29 3	7·05	10·47	6·29	·67	35·39	33·54	10·47	22·04	3·95	1·18
2	„ 5	500	4·7	23½	23 6	50½	25 3	6·07	8·56	5·14	2·29	41	35·05	31·07	13·56	14·25	2·22	3·49	1·32
3.	„ 6	500	4·2	21	21 0	53½	27 9	6·05	6·35	3·95	1·81	2·15	34·91	33·95	27·57	3·54	1·14
4	„ 7	500	4·0	20	20 0	53½	26 9	6·10	6·32	3·53	1·79	2·29	35·10	33·87	32·33	4·64	3·66	0·84
5	„ 10	500	3·8	19	19 0	51½	25 9	6·18	6·31	3·14	1·64	2·55	36·03	34·31	34·28	5·40	3·32	0·69
6.	„ 11	500	2·6	13	13 0	46½	23 3	5·58	5·25	1·61	1·82	1·16	40·59	25·16	20·60	3·23	0·20

VICTORIAN RAINFALL.

Fourth Quarter, Year 1915.

From the table given below it will be seen that, with the exception of the Mallee and Wimmera districts, and also parts of the Western, the remainder of the State had rainfall in excess of average, more especially

so in the North-East. The greatest deficiencies occurred in the Northern Mallee and the Southern Wimmera. For November the greater portion of Victoria experienced rainfalls, in many instances much below the normal, the deficiencies being greatest in the Northern area; but in the West Coast, and also in parts of Gippsland, many stations had abundant rains, and taken as a whole these two districts approximated closely to the normal. December was an exceedingly dry month throughout, at some stations no rain whatever being recorded, more particularly so in the newer Mallee. In the Wimmera and Mallee good crop yields were being obtained, and reports were generally of a cheerful character, some crops averaging as high a standard as 42 bushels to the acre. In the North, good to fair crops were being gathered, but in some instances the yields did not come up to anticipations, frosts being the principal cause, and severe thunderstorms also mitigated against the hoped-for results. A more prosperous season was experienced in the Central North; grass abundant, and stock in splendid condition. Reports from the North-East were hardly so cheerful, as the inadequate November rains tended to lessen the yield. In the Western District crops exceeded anticipations, and in many places hay crops of over 4 tons to the acre were met with. The same applies to the South Central, although rain is now badly required there. In Gippsland grass was dry, but still abundant, and the stock in good condition, though the milk supply was lessening owing to the scarcity of the December rains. Most rivers and creeks were low throughout the whole of the State.

District.	—	October.	November.	December.	Quarter.
		Points.	Points.	Points.	Points.
Mallee North	District Mean.. ..	57	11	0	68
	Normal	105	73	92	270
	Per cent. departure from normal	−46	−85	−100	−75
Mallee South	District Mean.. ..	88	26	36	150
	Normal	110	90	97	297
	Per cent. departure from normal	−20	−71	63	−49
North Wimmera ..	District Mean.. ..	102	34	29	165
	Normal	151	109	100	360
	Per cent. departure from normal	−32	−69	−71	−54
South Wimmera ..	District Mean.. ..	101	45	13	159
	Normal	185	132	115	432
	Per cent. departure from normal	−45	−66	−89	−63
Lower Northern Country	District Mean.. ..	162	19	32	213
	Normal	132	118	111	361
	Per cent. departure from normal	+23	−84	−71	−41

VICTORIAN RAINFALL—*continued.*

District.	——	October.	November.	December.	Quarter.
		Points.	Points.	Points.	Points.
Upper Northern Country	District Mean.. ..	189	35	35	259
	Normal	171	146	133	453
	Per cent. departure from normal	+9	−76	−74	−43
Lower North-East ..	District Mean.. ..	431	39	100	570
	Normal	238	193	195	626
	Per cent. departure from normal	+81	−80	−49	−9
Upper North-East ..	District Mean.. ..	508	160	140	808
	Normal	369	299	281	949
	Per cent. departure from normal	+38	−46	−50	−15
East Gippsland ..	District Mean.. ..	333	140	124	597
	Normal	282	222	267	771
	Per cent. departure from normal	+18	−37	−54	−23
West Gippsland ..	District Mean.. ..	431	221	37	689
	Normal	311	259	274	844
	Per cent. departure from normal	+37	−15	−86	−18
East Central	District Mean.. ..	399	155	63	617
	Normal	323	276	287	886
	Per cent. departure from normal	+24	−44	−78	−30
West Central	District Mean.. ..	213	97	47	357
	Normal	197	174	165	536
	Per cent. departure from normal	+8	−44	−72	−33
North Central ..	District Mean.. ..	246	84	36	366
	Normal	216	191	177	587
	Per cent. departure from normal	+14	−57	−80	−38
Volcanic Plains ..	District Mean ..	185	104	25	314
	Normal	223	183	167	573
	Per cent. departure from normal	−17	−43	−85	−45
West Coast	District Mean.. ..	301	102	13	509
	Normal	261	197	193	651
	Per cent. departure from normal	+16	−3	−93	−22

N.B. —100 points = 1 inch.

H. A. HUNT,
Commonwealth Meteorologist.

FIFTH VICTORIAN EGG-LAYING COMPETITION, 1915-1916.

Commenced 15th April, 1915; concluding 14th April, 1916.

CONDUCTED AT THE BURNLEY SCHOOL OF HORTICULTURE.

Six Birds. Pen No.	Breeds.	Owner.	Totals. 15.4.15 to 14.12.15	Totals. 15.12.15 to 14.1.16	Totals. Nine months.	Position in Competition.
		LIGHT BREEDS.				
		WET MASH.				
38	White Leghorns ..	G. McDonnell	1,116	162	1,278	1
34	,, ..	H. McKenzie and Son ..	1,104	149	1,253	2
2	,, ..	E. A. Lawson	1,109	144	1,253	
42	,, ..	W. M. Bayles	1,081	153	1,234	4
19	,, ..	L. G. Broadbent ..	1,074	140	1,214	5
8	,, ..	C. J. Jackson	1,059	147	1,206	6
5	,, ..	J. J. West	1,035	136	1,171	7
7	,, ..	*Marville Poultry Farm* ..	1,031	140	1,171	
21	,, ..	E. B. Harris	1,048	108	1,156	9
30	,, ..	A. E. Silbereisen ..	1,003	143	1,146	10
23	,, ..	Fulham Park	987	155	1,142	11
59	,, ..	W. G. Osburne	985	156	1,141	12
28	,, ..	R. Lethbridge	984	148	1,132	13
3	,, ..	J. H. Gill	981	146	1,127	14
9	,, ..	J. Schwabb	1,005	120	1,125	15
54	,, ..	W. G. Clingin	968	144	1,112	16
16	,, ..	N. Burston	977	130	1,107	17
6	,, ..	F. Doldissen	986	118	1,104	18
11	,, ..	J. B. Brigden	967	136	1,103	19
39	,, ..	W. M. Sewell	982	119	1,101	20
50	,, ..	John Hood	969	129	1,098	21
18	,, ..	D. Adams	951	145	1,096	22
44	,, ..	Mrs. F. M. Oliver ..	968	127	1,095	23
4	,, (5 birds)	R. Hay	977	114	1,091	24
26	,, ..	A. Mowatt	982	102	1,084	25
1	,, ..	Mrs. H. Stevenson ..	953	131	1,084	26
10	,, (5 birds)	A. E. Tuttleby	966	116	1,082	27
13	,, ..	T. Hustler	967	114	1,081	28
53	,, (5 birds)	W. G. Swift	997	66	1,063	29
24	,, ..	Lysbeth Poultry Farm ..	940	122	1,062	30
20	,, ..	R. W. Pope	917	145	1,062	
32	,, ..	F. Hodges	913	115	1,028	32
49	,, (5 birds)	Bennett and Chapman ..	912	112	1,024	33
27	,, ..	J. A. Stahl	907	147	1,054	
58	,, ..	Thirkell and Smith ..	896	155	1,051	35
43	,, ..	H. I. Merrick	900	148	1,048	36
25	,, (5 birds)	Giddy and Son	926	110	1,036	37
15	,, ..	R. N. H. Mirams ..	890	146	1,036	
33	,, (5 birds)	A. W. Hall	906	125	1,031	39
22	,, ..	S. Buscumb	868	151	1,019	40
60	,, ..	*H. C. Brock*	907	107	1,014	41
47	,, ..	J. C. Armstrong ..	877	131	1,008	42
36	,, ..	Weldon Poultry Yards ..	881	123	1,004	43
48	,, ..	C. J. Beatty	887	118	1,005	44
55	,, ..	W. N. O'Mullane ..	888	116	1,004	45
41	,, ..	J. A. Donaldson ..	859	129	988	46
12	,, ..	G. Hayman	856	119	975	47
46	,, ..	R. Berry	838	122	960	48
40	,, ..	C. C. Dunn	817	124	941	49
45	,, ..	South Yan Yean Poultry Farm	825	117	940	50
52	,, ..	A. A. Sandland	825	113	938	51
57	,, ..	B. Mitchell	804	108	912	52
37	,, ..	A. Ross	776	132	908	53
14	,, ..	W. Flood	736	125	861	54
31	,, ..	L. McLean	718	126	844	55
56	,, (5 birds)	C. Hurst	694	101	795	56
		Total	52,141	7,210	59,681	

FIFTH VICTORIAN EGG-LAYING COMPETITION, 1915-16—*continued.*

Six Birds. Pen No.	Breeds.	Owner.	Totals. 15.4.15 to 14.12.15	15.12.15 to 14.1.16	Nine months.	Position in Competition.
		LIGHT BREEDS.				
		DRY MASH.				
80	White Leghorns ..	W. H. Robbins	1,151	139	1,290	1
68	,, ..	H. McKenzie and Son ..	1,056	159	1,215	2
79	,, ..	Lysbeth Poultry Farm ..	982	134	1,116	3
63	,, ..	A. H. Padman	966	142	1,108	4
76	,, ..	A. A. Sandland	962	138	1,100	5
69	,, ..	E. MacBrown	965	131	1,096	6
62	,, ..	Benyerren Egg Farm ..	944	142	1,086	7
64	,, (2 birds)	W. M. Bayles	966	94	1,060	8
66	,, ..	E. A. Lawson	924	131	1,055	9
67	,, ..	C. C. Dunn	893	154	1,047	10
72	,, ..	Mrs. E. Zimmerman ..	913	126	1,039	11
65	,, ..	Thirkell and Smith ..	906	133	1,039	
78	,, ..	H. Hanbury	919	116	1,035	13
71	,, ..	Moritz Bros.	888	146	1,034	14
61	,, ..	Mrs. H. Stevenson ..	911	116	1,027	15
77	,, ..	South Yan Yean Poultry Farm	778	136	914	16
73	,, ..	C. L. Lindrea	779	125	904	17
74	,, ..	J. H. Gill	685	115	800	18
75	,, (5 birds)	Fulham Park	677	104	781	19
		Total	17,265	2,481	19,746	
		HEAVY BREEDS.				
		WET MASH.				
86	Black Orpingtons ..	C. E. Graham	1,027	119	1,196	1
97	,, ..	Marville Poultry Farm ..	1,033	116	1,149	2
89	Rhode Island Reds	E. W. Hippe	953	114	1,067	3
85	Black Orpingtons ..	H. H. Pump	968	101	1,069	4
92	,, ..	J. Ogden	917	148	1,065	5
100	,, (5 birds)	J. H. Wright	980	82	1,062	6
81	,, ..	Mrs. T. W. Pearce ..	962	98	1,060	7
93	,, ..	L. W. Parker	913	108	1,021	8
88	,, ..	J. McAllan	918	92	1,010	9
91	,, ..	A. Greenhalgh	891	107	998	10
99	,, ..	L. McLean	880	93	973	11
90	,, (5 birds)	Oaklands Poultry Farm ..	878	85	963	12
84	,, ..	Cowan Bros.	852	106	958	13
87	,, ..	W. C. Spencer	861	86	947	14
98	Faverolles ..	K. Courtenay	768	138	906	15
95	Silver Wyandottes ..	W. H. Forsyth	775	92	867	16
94	Black Orpingtons (5 birds)	D. Fisher	805	58	863	17
83	Black Orpingtons ..	G. Mayberry	720	87	807	18
82	White Wyandottes	J. B. Brigden	551	81	632	19
96	White Orpingtons ..	Stranks Bros.	572	30	602	20
		Total	17,307	1,941	19,248	

MONTHLY REPORT.

Weather conditions for the month have been very trying, the birds being affected on more than one occasion. The variations in temperature have been as much as 42 deg. F. in six hours.

Some birds are now moulting and broodies are plentiful. The health of the birds is satisfactory, and the egg yield good for the season. Temperature, lowest 56 F.; highest 109 F., in houses. Rainfall, 63 points.

Department of Agriculture,
Melbourne, Victoria.

A. HART,
Chief Poultry Expert.

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Principal, School of Horticulture, Burnley.

The Orchard.

Orchardists will be busy during February with the gathering and marketing of early and export fruit. In gathering fruit every care should be taken to see that it is not in any way bruised or crushed. This is often the cause of fruit decaying so rapidly and of the deterioration of fruit in the fruit room. All fruit should be handled as lightly as possible.

Another point to be observed is the necessity for grading fruit for the market. Grading pays, and it pays handsomely. A buyer will never offer a good price for mixed grades, more especially as he will probably require to grade it if he wishes to resell it. A good price will always be obtained for first-grade fruit, while the low price offered for mixed grades can generally be secured for the lowest grades as well. The more exact the grading, the more profit for the fruit-grower: the more care in packing, the more returns for the producer: and so the greater care and exactness, the better it pays to grow fruit.

A final spraying for codlin moth will be necessary this month. The fallen fruit should all be collected and boiled, and all crevices and hiding places searched for larvæ. The season has been favorable to the development of bryobia mite and woolly aphis, and, as soon as the fruit has been picked from the trees attacked by these insects, a good spraying of strong tobacco water should be given. This will minimize to a great extent the winter work. Cultivation should still be proceeded with, and the soil kept in a continual condition of surface friability. This is especially necessary at this time of the year. With a good supply of moisture in the soil, it should be well conserved, so that the growing period of the trees may be continued until early autumn, when the trees should be allowed to ripen their wood.

Budding may be continued, and if an early start were made the buds may be allowed to push their way out into growth, so that they may harden and be ready for pruning in the proper season. Buds that are placed in late season should be left dormant until the spring-time. Summer pruning may also be continued, and all superfluous terminal lateral growths removed, so as to strengthen the remaining buds and also to force out fruit buds for next season.

Fumigation.

Evergreen trees, including those of the citrus family, that are infested with scale, should now be sprayed or fumigated to rid the trees of this pest. For spraying, a weak red oil emulsion, lime and sulphur spray, or resin wash will be found useful for the purpose. The most successful method, however, of dealing with the scale pest is by fumigation. The trees should be closely enveloped in an airtight sheet or tent, and hydrocyanic gas should be generated inside. The chemicals for generating the gas, as well as the fumes of the gas itself, are ex-

cessively dangerous, and great care should be exercised in their manipulation. A wooden, enamel, or earthenware vessel is placed inside the tent, the vessel containing a mixture of 4 fluid ounces of sulphuric acid, and 12 fluid ounces of water, the acid being placed in the vessel first. Four ounces of cyanide of potassium should then be quickly dropped into the vessel, and the tent closed down at once; the bottom of the tent all round should be covered with soil to prevent any of the gas escaping. The operator must take care that not the slightest portion of the fumes is breathed. Fumigation should be carried out at night-time or on a cloudy day, and the foliage of the trees must be thoroughly dry.

Vegetable Garden.

Celery crops will now be a prominent feature in the vegetable section. The seed may be sown from January to March, and succession plantings should be carried out occasionally during those months. The growth of celery should be quick; a fair supply of water and a good rich, loose soil are helpful to its growth.

Ample water will now be required in the vegetable garden. The surface should be kept well hoed, and mulchings of manure should be given wherever possible.

Cabbage, carrot, turnip, radish, lettuce, peas, cauliflower, &c., seeds may now all be sown, and young plants from any seed beds may be planted out.

Flower Garden.

Constant watering and hoeing will now be required to keep the flower garden in a condition of success. Cannas will require manuring: the old flowering stems should be removed to make way for the new growths. Dahlias and chrysanthemums will need a great deal of attention, staking the growths as they develop, disbudding, thinning out weak shoots, and removing unnecessary growths. The dahlias should receive a good soaking of water during the hot weather, and liquid manure or quick acting fertilizers should be given when the flower buds are developing. When chrysanthemum buds are very small liquid manure should be applied. Roses may now be summer pruned; all weak growths should be removed, and the strong ones shortened to a fairly good bud. The plants should then receive occasional waterings with liquid manure, and be kept well supplied with water.

All flowering trees and shrubs that have finished blooming should be pruned, the flowering growths removed, and, unless the seed is required, all seeds heads should be cut off.

Cuttings of pelargoniums, zonale and regal, may now be planted; delphinium spikes that have finished flowering should be cut down to make way for new growth, the plant being watered and manured. Seeds of perennial and hardy annual plants may now be sown, and a few bulbs for early flowering may be planted. The beds should be well manured and deeply worked in anticipation of planting the main crop of bulbs.

REMINDERS FOR MARCH.

Live Stock.

Horses.—Feed as advised last month. Those in poor condition should be "fed up" in anticipation of winter.

Cattle.—Cows in milk should have plenty of succulent fodder, and water easy of access. Algerian oats should be sown on suitable land for grazing off in the winter. Sow a mixture of oats, rye, and tares or peas for winter fodder or to fill silos. Only exceptional cows and those required for town milk supply should be served between now and July. Within the next two or three months is the best time for cows to calve, as they will pay to feed through the winter and give the best returns for the season, and be dried off when the grass is dry and scarce. Calves should be given lucerne hay or crushed oats where grass is not available.

Pigs.—Sows about to farrow should be provided with short bedding in well-ventilated sties. See that the pigs have shade, and water to wallow in. There should be plenty of cheap feed now, and pigs should be highly profitable. Read articles on breeding, feeding, &c., of pigs in *Journals* for April, 1912, June, 1913, May, 1915.

Sheep.—All ewes should be kept strong for lambing. Crutch round tails and lessen accumulation of discharge, and consequent attraction to the fly pest at lambing time. Clear wool from round udders and teats and thereby save many a lamb in bad weather; especially is this necessary in the case of young ewes of the Merino and Lincoln crosses. Clear wool from eyes also. In crutching ewes when close to lambing lay them over carefully, grasp by the thigh low down, not by the flank as is generally done, which is a careless practice. Pure British breeds of ewes and very coarse cross-breds may still be only coming in season; rams should be left mated to make sure. Have good grass paddocks, if season favorable, to cut off ewes with early-born lambs into, for extraordinary prices will be available again this winter.

Poultry.—Cull out the drones and get rid of surplus cockerels. Keep forward pullets well fed—eggs are rising in value. Repairs to houses should be done this month. Thoroughly cleanse all houses and pens. Spray ground and houses with a 5 per cent. solution of crude carbolic acid, to which should be added a little lime—this will act as a safeguard against chicken pox; burn all refuse and old feathers. Provide a liberal supply of green food. For each moulting hen, add a teaspoonful of linseed to the morning mash. Use tonic in water, which should be kept in cool shady spot.

Cultivation.

Farm.—Work fallow where possible for autumn sowing of cereals. Sow winter fodder crops, such as rye, barley, and vetches. Prepare land for lucerne plots for autumn seeding. Make silage of maize and other crops for winter use.

Orchard.—Prepare new land for planting; plough deeply and subsoil; leave surface rough. Plant out strawberries after first rain. Plant crops for green manure. Continue to fight the Codlin Moth.

Vegetable Garden.—Prepare ground for winter crops. Plant out seedlings in moist soil. Sow cabbage, cauliflower, lettuce, early peas, swede turnip, beet, carrot, radish, and early onions.

Flower Garden.—Cultivate and water. Feed dahlias, chrysanthemums, and roses. Plant out shrubs, trees, and all kinds of bulbs. Sow hardy annuals. Plant geranium and pelargonium cuttings. Spray for Aphis, Red Spider, and Mildew.

Vineyard.—Select scions, if not done last month. Where ripening is difficult, assist by removing basal leaves only, as soon as berries change colour. This is the month for drying currants, sultanas, and gordos (Lexias and Clusters). Do not pick before grapes are properly ripe. For instructions for packing grapes for export, apply to Department. Shipments should be made in March and early April.

Cellars.—Vintage month. For light dry wines, pick as soon as grapes are ripe; do not wait for over-maturity, as is so often done. Pay attention to acidity; correct same if necessary with tartaric acid or late grapes. Acidimeter supplied by Department; price, 3s. 6d. Sulphiting and the use of pure yeasts are strongly recommended, as they insure production of sound wine; further information supplied on application.